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To afford the opportunity to mechanics and others of examining and testing the value of The TRADE REVIEW AND WESTERN MACHINIST, to themselves, the Proprietor will send this Journal three months, for only FIFTY CENTS. postage paid, to any address in this country or Canada.

CLEVELAND.

The advantages possessed by Cleveland for manufacturers and trade cannot be made too widely known. Cities are now-a-days in competition with each other, and the advantages of those favored by geographical position, by vicinity to the raw materials of industry and extreme facilities of railway and water communication, will place it in the van. Cleveland is noted not only for the magnitude of many of its industries, but the variety of these industries. The commerce of every city in the products of its own industries constitutes a much more reliable and more profitable source of enterprise than its merely distributive trade, but the many railway lines possessed by Cleveland, and its water transport, afford connections with all parts of the country unexcelled by any inland city. Her cheap transportation, her being the great entreport for the bituminous coal of this region, her facilities for procuring readily the various kinds of raw material, embracing lumber, lead, and copper, together with the organized capital, and the intelligent enterprise of her merchants, assure the continued maintenance and rapid development of her prosperity. Then, as to foreign trade: The opportunity now afforded under our revenue laws for the direct importation of foreign merchandise and foreign products entering into manufacture, place Cleveland in much the same position to these as the cities of the Atlantic seaboard. Year by year, too, Cleveland, as well as Ohio products of manufacture, are going more abroad, and with the enlargement of the Welland canal a more profitable export trade than that now carried on may be anticipated. Within a few days a shipment of grain to Buffalo has been made and direct from this port for New York, and there is no reason why, in the future, when business organization has shaped itself to this course, we should not have large grain shipments from this port to Europe. Our inland traffic has been largely deflected from lakes and canals to the railroads, but the development of traffic on the railroads has been much greater in magnitude than the deflection of traffic. If our lake tonnage, as we had lately occasion to show, has not materially increased we can yet show a superior class of vessels in steam craft of a capacity never approached in former years. Cleveland's industrial progress shows a sure and steady growth, followed by rapid enlargement of enterprise, commensurate with the development of the commerce of the whole country, especially with that portion of commerce which sustains relations to our many industries. The extensive concentration of smelting mining interests in the Hocking Valley will do much to favor Cleveland's advance, and improve her position in respect to the rivalry which has sprung up at the lower lake ports. There are three features in railroad construction which concern us, the lines connecting us with the Atlantic seashore, with the States west of Ohio, and those connecting Cleveland with the States south of the Ohio river, and south of the State of Missouri. The numerous railway links with the grand trunk lines that have been constructed have done much to increase directly and indirectly the value of Cleveland's traffic and to stimulate her manufactures, many of which are, apparently, destined to rise to high importance, have been established the past few years, and we constantly hear of manufacturers from the East, and less favored localities in the West, searching out for sites here to which they may transfer their shops. The instructions that have been sent out by the Bureau of Statistics, looking to the collating of detailed returns of manufactures will be of especial interest as regards Cleveland, affording, as the facts will, comparison with other cities. It is to be wished that our Board of Trade was as enterprising in this respect as that of Cincinnati, which yearly issues a report, filling columns in the volume of Ohio statistics, thus making known its capacity of production near and far, whilst in the same volume this great city of Cleveland is disposed of in a few lines, followed by a barren list of her manufactures.

RAILWAY FREIGHT DISCRIMINATION.

An important decision has been given in the matter of railway shipments by the United States Circuit Court of the Northern District of Ohio, on motion for a new trial. The plaintiffs, who are engaged in mining coal at Salineville, had brought suit against the Pennsylvania Railroad Company for compensation for discrimination made against them in rates of freight as compared with larger shippers. The point on which the case hinged was whether a discrimination in rates of freight between the same points, resting solely upon the amount of freight offered by the respective shippers is unreasonable and unjust. Under the schedule the plaintiffs were required to pay higher rates on the coal shipped by them, than were exacted from other and rival parties who shipped larger quantities. The defendant company contended if the discrimination was made in good faith, and increasing its tonnage, it was both reasonable and just, and within the discretion confided by law to every common carrier. The court below instructed the jury that the discrimination complained of was contrary to law and a wrong to the plaintiffs for which they are entitled to damages, and a verdict had been rendered accordingly. The present was an application for a new trial. The basis of the decision was thus presented by the court. Harmless discriminations may be indulged in. For instance, the carrying of one person who is unable to pay fare, free, is no injustice to the other passengers who may be required to pay the reasonable and regular rates fixed by the company. It is the custom for railroad companies to carry fertilizers and machinery for mining and manufacturing purposes, to be employed along the line of their respective roads, to develop the country and stimulate productions, as a means of insuring a permanent increase of their business, at lower rates than are charged on other classes of freight; because such discrimination while it tends to advance the interests of all, works no injustice to any one. There was in this case no undertaking by anyone to furnish any specific quantity of freight at stated periods, nor was anyone bound to tender coal for shipment in fully-loaded trains. The plaintiffs occupied common ground with the parties who obtained lower rates. The discrimination complained of rested exclusively on the amount of freight supplied by the respective shippers during the year. To recognize such discrimination would be to allow that the business of the country is, in some degree, subject to the will of railroad officials; for if one man engaged in mining coal, and dependent on the same railroad for transportation to the same market, can obtain its transportation at from 25 to 50 cents per ton less than another competing with him in business, solely on the ground that he is able to furnish and does furnish the larger quantity for shipment, the small operator will sooner or later be forced to abandon the unequal contest and surrender to his more opulent rival. If the principle is sound in its application to rival parties engaging in mining coal, it is equally applicable to merchants, manufacturers, millers, dealers in lumber and grain, and to everybody else interested in any business requiring any considerable amount of transportation by rail; and it follows that the success of all such enterprises would depend as much on the favor of railroad officials as upon the energies and capacities of the parties prosecuting the same. The motion was accordingly denied. There is no doubt that a discrimination in favor of parties furnishing the largest quantity of freight, and solely on that ground, is a discrimination in favor of capital, is contrary to a sound public policy, and is a wrong to the disfavored party for which the courts are competent to give redress.

A BRILLIANT DISCOVERY.

The day is certainly prolific of invention. Long as gas has been used, its full virtue in affording a brilliant light and at a nominal cost has only lately been discovered. In ordinary gas it is well known that only about four per cent of the volume contains the real materials, and to obtain this the coal has to be wastefully distilled. Now what is to be said of an invention that obtains a brilliant light from from heating gas, a gas which in itself is unilluminating, which can be produced without waste, and which, in the process we shall explain, is wholly consumed! The invention is that of Dr. Reynard, of Paris. Common coal heating gas is used to heat to incandescence a platinum wire cage. In the new lamp, an air pipe which ends in a tapered cone enters a small space or chamber of the gas-supply near the burner, and a little below it is a short arm which supplies a supplementary air current. Through this tapered cone air is forced under a pressure of 6 in. or 7 in. of water. The mixture of gas and air thus produced is carried into the burner, which is a cage of platinum wire, about three times as long as it is wide. When the gas is first lighted it is a roaring flickering flame, with no appreciable illuminating power; but soon the platinum gauze becomes hot, and in a few seconds the burner presents the appearance of a glowing pillar of solid light possessing intense brilliancy. The combustion of the gas itself in this case yields no illuminating power worth speaking of, the brilliancy of the new light being due to the high temperature of the platinum gauze, which becomes incandescent just as the carbon threads in the electric lamps glow with the heat engendered in them by the current. An ordinary Lewis burner of this kind gives a light of

over fifty candles for every ten foot of gas per hour; but by increasing the pressure and the consumption of gas a much higher economy can be attained—as much as 180 candles for 20 feet of gas. The dispensing with illuminating gas is a feature in this invention. In the experiments made in London, heating gas answers better than illuminating gas. In ordinary gas, it is well known that only about four per cent. of the volume contains the real illuminating materials, but to obtain that the coal has to be wastefully distilled. If heating gas, as it is called, will produce so brilliant a light, 15,000 feet can be obtained from every ton of ordinary coal instead of only 10,000 feet. The gas is completely burned—there is no waste in smoke— and the surface of the gauze being so much larger than is possible with the electric lamps, there is greater quantity and less intensity; in other words, the light is better distributed and is more penetrating, while less trying to the eye. The sciences of attack and defence in war have advanced alternately, and so gas which has appeared to be a losing cause is reinforced, and is likely to have its existence prolonged and position raised as a rival of electricity.

STANDARD WIRE GUAGE.

The Railway Master Mechanics' Association wisely directed its attention to the securing of accurate measurements in ordering or making sheet and wire. Dubiousness has resulted from reference to different standard guages, as the Birmingham wire guage, Stubb's wire guage, and others. Now it is proposed that without referring to guages, purchasers should state exactly what they want. All differences can be measured, and the method proposed will do away with great difficulties that have arisen from the multiplicity of guages in executing orders correctly. The advantages of a uniform system are so great that the ready concurrence of manufacturers may be looked for in the action taken. On the micrometer guage adopted is a little column upon which are divisions, and each division represents 25–1000 of an inch, or one fortieth. On the standard is a little revolving cylinder, on the bottom of which are divisions. There are twenty-five divisions on the cylinder. The turning of one division lifts the screw exactly the one-thousandth part of an inch. A person having a very good eye can turn up a half of that and get a most accurate measurement of one two-thousandth of an inch, and so on less than that. The screw can be set to as fine a guage as any one wishes to mark to.

IT is a little matter of surprise that the advisory commission on differential rates by the trunk lines between the West and the seaboard should have declined to suggest any alteration. They allow that these rates constitute a temporary arrangement only—equitable, as for the present, but which may become inequitable before the lapse of any considerable time, and they add that whenever they shall be found to operate unfairly and give forced or unnatural direction to trade, and whenever it shall appear that they tend to deprive any of the seaports affected by them of the proportion of business that would naturally come to it under the operation of nominal competition, want of equity in rates will appear, and it will be right to modify or perhaps abolish them. Railroad problems assume such different phases from year to year, and almost from day to day, that those who have authority in railroad matters may justly be expected and required to give their earnest attention and best efforts to make their franchises accomplish the great ends of equal, fair, prompt, and beneficial accommodation which was intended in their grant.

The balance of trade against us, through foreign imports, increases. Last week the excess of imports over exports at New York was $3,111,889. The value of the merchandise imported last week was $10,738,478, or $2,449,437 greater than for the week of 1881; the value of the merchandise exported was $7,626,589, or $162,449 greater than for the week of 1881. For the thirty weeks since January 1, this year, the value of merchandise imported was $46,999,458 greater than for the corresponding time in 1881, while the value of the merchandise exported is $35,245,455 less; difference, $82,244,913. For the thirty weeks of last year the imports exceeded the exports only $28,684,698; this year the imports exceeded the exports $110,939,611; difference, $82,244,913. To date last year the imports of specie at New York, $30,509,751, exceeded the exports by the sum of $23,759,226; to date this year the exports of specie, $39,578,288, exceed the imports by the sum of $37,482,677—a change of $61,241 903 to the credit of the port, yet lacking $21,003,010 of equalling the increased debit in the merchandise account. The belief is that the balance will not have to be settled in cash but will be disposed of by forthcoming shipments of grain.

THE arguments by commercial men before the Tariff Commission has plainly shown difficulties which should be removed, and inconsistencies which should be remedied. The case of nickel may be instanced. This pays a tax of 30 cents a pound, whilst nickel alloyed with copper, which pays only 20 cents a pound. When the bill was passed imposing the duty an alloy of half nickle and copper was being imported, and that was the reason for the distinction; but now in order to evade the law importations are being made of 95 per cent. nickel and 5 per cent. copper. That was evidently a fraudulent evasion of the law, and yet, under the decision of the Supreme Court in the sugar cases it was doubtful if the full duty of 30 cents a pound could be legally collected. It is plain that the Commission should consult experts as to each article on which the question of specific or advalorem duties is raised. The present tariff, as Mr. French observed, is encumbered with a great many absurdities and useless restrictions.

A NUMBER of inventors are apt to think that the modification of a machine is an improvement, and even manufacturing machinists on the strength of such improvement will venture to make and place it on the market. Several of our mechanical exchanges announce that a machinist in Phœnixville, Pa., is said to have devised a valuable improvement in planers, by which the capacity of these machines will be materially increased. In the ordinary planer the cut is made only while the material is moving toward the tool-holder, while by the improvement referred to there will be a cut both ways. The machine is nothing new. A planner that will cut both ways has been brought out a dozen times in as different localities within the last thirty years, but like a number of combination machines, the ingenuity displayed in their construction has not recommended them to general adoption.

THE grain and provision market of Chicago verges almost on a panic Prices seem to fall down with each new arrival of wheat. The arrivals of winter wheat are immense, and the fact that some new spring wheat of exceptionally fine quality has already appeared in the market has precipitated still more the downward movement of prices. If minor speculators do not oversell the market, and thus give the big sharks of the Chicago Board of Trade a chance to resume their twisting operations wheat will probably sell soon below 90 cents a bushel, and will drag down the price of all other cereals in proportion. Reports of the growing crop are somewhat less favorable than they have been for the past two weeks.

MANUFACTURES.

TO MACHINISTS. MANUFACTURERS AND OTHERS.

THE publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

OHIO INDUSTRIES.

THE Ohio Lantern Company, Bellaire, have now ready for the trade their "Brilliant" lantern, for kerosene oils, and it is one of the finest we have yet seen. The company have four patents on this lantern, and it is perfectly safe to use under all circumstances. It is extremely cheap, strong, durable, handsome, and of high light giving quality. It is easily lighted and extinguished, can be readily opened, and the globe is always held firmly in position.

THE Cuyahoga Works, Cleveland, have nearly completed one of their largest class blowing engines for an anthracite furnace at the Franklin Iron Works, near Utica, N. Y. The steam cylinder is 40-inch bore, and the air cylinder 84-inch bore, both being 54-inch stroke. The engine will have a surface condenser and air pump attached.

THE Steubenville Flint Glass Bottle Company of Steubenville, Seventh and North streets, is a new corporation, composed altogether of practical workmen, who thoroughly understand all the details of the business. They make flint prescription vials, mustard, catsup and pickle bottles, and flasks.

THE Brown Manufacturing Company's Works, Zanesville, have been destroyed. The building was a three-story brick, and cost, when built nine years ago, $40,000. Two hundred men were thrown out of employment. The total loss is $125,000; insurance $47,000.

BUT one of the stacks owned by the Hubbard Furnace Co. is in blast. The other needs a new lining, which has been purchased, but it will not be put in until the condition of the iron market warrants the stack being started.

THE dimensions of the buildings of the Bartlett Iron and Steel Works, Vermillion, to be shortly erected, will be 60x100 feet, The capital of the company is $500,000. Several hundred men will be employed.

THE Ironton Hoe and Tool Works have their new hammers and other machinery in full operation, and are now manufacturing picks and mattocks, and filling their first orders.

A JOINT stock company has been formed at Youngstown to be called the Witman Stove Company, with capital stock of $50,000.

THE rebuilding of the Globe Foundry at Niles, destroyed by fire last week, has been commenced by Mr. John Carter.

THE rolling mill of Westlake & Co., Warren, is running double turn. Two hundred men are employed.

THE Wrought Iron Bridge Co. at Canton, reports a number of contracts on hand, and its shops are full of work.

THE Barney & Smith Manufacturing Co., Dayton, makers of passenger and freight cars, employ 1,200 hands.

THE Youngstown Car Works are building a number of cars for the Pittsburg & Lake Erie Railroad.

THE proprietors of the Trumbull Wagon Works of Defiance contemplate moving them to Toledo.

THE Leetonia Tool Company have filed a certificate of increase of capital of $20,000.

THE Sandusky Basket Co. has been incorporated with a capital of $20,000,

THE Howard furnace, Youngstown, has been blown in. They will make a specialty of hot blast foundry iron

A NEW oil pump and can factory will shortly be established at Warren.

A NEW brush factory is to be established at Alliance.

Eagle Blast Furnace, Youngstown, is undergoing repairs.

Alliance is to have a car shop.

OUR ENGLISH CORRESPONDENCE.

WOLVERHAMPTON, July 24.

The peculiarity of the North of England iron trade is that it has depended for some years almost entirely upon the shipbuilding industry as it did aforetime on iron rails. The iron rail trade has given place to steel. There is, of course, nothing that can dispose of the shipbuilding industry in the same manner, for though steel may be substituted instead of iron, Cleveland can still supply it. It may, however, be found—and here comes in the pessimist—that ships may be built too fast, or that the tendency of the time may make them too costly for the trade which they do, and the rates of freights they are enabled to obtain, which are nothing so good as formerly. There is no doubt whatever about the falling off of inquiries in the ship-building trade, and in the face of the dullness in the freight market, and the large amount of tonnage now building, this is not to be wondered at. Many think that things have been too much enhanced. As compared with three years ago, the iron of which they are built is 30 per cent. higher, and the labor is more. It is computed that over 20 per cent. more is to be paid for vessels than was the case, and that £6,000 to £8,000 represents the additional cost of the pattern cargo steamer of 3,000 tons. This appears to have stopped further buying of steamers for the present, and the question is whether the trade of the country will so increase in volume as to allow this extra cost to be put on freights, or whether in point of fact it can keep pace with the enormous amount of shipping now going forward.

The pig iron market is steady; Cleveland makers still adhere to their price of 43s. 6d. for No. 3, and business is being done at about 3d. per ton less by merchants. It was reported on 'Change here that there was a considerable decrease in stocks to the end of June. The manufactured iron trade is much about the same as it has been for some weeks; ship plates are quoted at £7 per ton delivered to ship yards, and angles £6 10s., but they can probably be bought at from 2s. 6d. to 5s. per ton below these figures. The Middlesbrough market continues firm at 43s. for No. 3 pig iron, but there has been little doing during the last few days. Connal's stock today is 121,994 tons, a decrease of 2,250 tons this week. The market for hematite pig iron is steadily improving, and quotations are advanced from 1s. to 2s. 6d. per ton. Warrants for mixed numbers f.o.b. Workington are now quoted 57s. 6d. For other descriptions of pig iron there is a firm market, and although the amount of business doing is limited, stocks are not increasing, and prospects are considered good. The finished iron trade in South Staffordshire is quiet, but steady, the leading makers are not overdone with orders, but this is usually the case during the week preceeding quarter day. Some of the second class makers are busy, while others want orders, and quotations vary accordingly. In North Staffordshire the extensive works are well employed on bar and plate orders, chiefly for shipment. In Shropshire the wire rod trade is dull, but sheets are in strong demand, and the bar mills are moderately busy. The trade in West Yorkshire is fairly active. At Leeds the makers of best Yorkshire iron are executing large orders for the Government and Indian railways.

There has been considerable impetus given to the sheet iron trade through buying on American account, and makers have, in consequence, raised the price of ordinary from 5s. to 10s. per ton. Freights for New York are slackening. Liverpool rates have been lowered to 12s. 6d. per ton. It is expected that this reduction will weaken the American market, but sufficient account is not taken of the slackening of demand on your side, and that you appear to have a sufficiency of supply. The statistical particulars of the Bessemer steel manufacture for 1881 have been issued by the British Iron Trade Association. This production amounted during last year to 1,023,740 tons, being an increase of 283,830 tons, or 38 per cent. on the output of 1880. Seventy per cent. on the ingots made in 1881 were thus manufactured into rails. Of the total steel rail production of last year, 549,419 tons were exported. Last year there were manufactured of Bessemer steel rails in the district of South Wales, 305,048 tons of rails; in Sheffield, 245,439; in Lancashire, 135,543; Cumberland, 121,093; in Cleveland, 216,004; Staffordshire, 588; making a total of 1,023,740 tons as against 739,910 tons in 1880. Your readers will thus see the important stimulus that has been given to rail manufacture of Bessemer steel ingots in 1881 being 1,441,719 as against 1,044,382 in 1880.

The exports of tinplate to the United States up to date show a large increase over those of last year, whilst stocks have not shown an appreciable decrease until at the close of the past month, even then it was but a transfer from here to the other side where though a shade better, the market is well stocked with plates of all sorts. Under these circumstances I am inclined to the view that we shall have to sail along in sympathy with the market in New York, waiting the development of better trade.

The engineering trade has generally been brisk. The locomotive and general trades have been fully engaged, while the railway works have been so busy that manufacturers deemed it advisable to raise the wages of their men.

INDUSTRIES IN GENERAL.

MAINE.

THERE are some ten nail machines in operation in the iron works at Pembroke, turning out large quantities of cut nails and spikes. The balance of the machines—25 in all—are being put in working order, preparatory to doing a large business as soon as plate can be made for them.

THE rotting mills at Cape Elizabeth have resumed.

MASSACHUSETTS.

AT Uxbridge the committee chosen to look into the patent machine and screw of E. Wilder, of Boston, for which there has been some talk of building a shop, report favorably, aud $75,000 has already been subscribed of the $200,000 wanted to begin with. It is the intention if the project is successful to erect a large shop.

THE wire mills at Palmer are nearly completed, and the machinery and stock are on the ground.

THE South Boston Iron Works have nearly completed for their own use 90-foot lathes, which are thought to be the largest and heaviest lathes in the world. They are made in six section of 30 feet each. The head stocks and face-plates weigh 10 tons each, and each bed section 10 tons. The completed lathes will each contain 600,000 pounds of iron.

THE addition to the American Tack Co.'s factory at Fairhaven, has been commenced. It is to be of stone, 90x36 feet, and three stories high.

THE works of the Holyoke Envelope Co., Holyoke, have a productive capacity of 800,000 envelopes per day, using up about three tons of paper daily. They do presses.

NEW HAMPSHIRE.

THE Sullivan Machine Company, at Claremont, some months since built a pulp-grinding machine, a recent invention, which was sent to Belden's Falls, Vt., and set to work in April. Its operation was found to be most satisfactory, and the company now have orders for seven more of them, three to go to Middlebury, and the others to Holyoke.

AT South Keene, the chair works of Mr. Hole constitute a village by itself. The brick factory is 160 by 40 feet, two stories, and the paint shop is 150 by 50 feet, four stories. The other buildings, including dry houses, saw mill and cottages for the workmen, number twenty-five. About a million feet of lumber is worked up in a year, and the product is from 20,000 to 25,000 chairs per month which find a ready market in West California and South America.

CONNECTICUT.

THE largest belt ever made from a single width of hide is said to have just been made by the Jewell Belt Company, of Hartford, for a New York flouring mill. It is 48 inches wide, 76 feet long, and weighs 1,000 pounds.

S. W. GOODYEAR, manufacturer of machines for pointing or reducing wire by cold compressing or swaging, Waterbury, has recently sold seven of these machines.

NEW YORK.

THE Walker A. Wood Machine Company, of Hoosic Falls, are now building over 200 machines per day, employing 1,400 hands, pay roll over $70,000 per month, using 50,000 feet of lumber, and melting 50 tons of iron daily. The capital stock of the company is $2,100,000.

WORK is about to begin on two new factories in Yonkers. One, to be used for the manufacture of heavy machinery, will be built on the Glenwood dock, in the upper part of the city. The owners are S. S. Hepworth & Co., whose works are now in New York City. The other will be erected for Yonkers Glass Company, on the banks of the Hudson, near the railroad station, at a cost of over $50,000.

PENNSYLVANIA.

THE Pennsylvania Steel Co., Philadelphia, employ 2,500 hands, and expect largely to increase their product when the heated term is over.

AN order has been given to the Baldwin Locomotive Works by the Reading Co, for 100 locomotives of the consolidated, dirt burning pattern.

THE Pittsburgh Smelting Co., established the 1st of April last, make a specialty of blast furnace and rolling mill work, house fronts, etc. They have met with good success, and now give employment to 40 hands. They are having a good run on hammer dies, ingot molds, and all kinds of anti-friction metal work.

THE Disston Saw Works, Philadelphia, is the largest establishment of the kind in the United States. They consumed last year 21,000 tons of coal; 10,000,000 feet of lumber; worked into edged tools 80 tons of steel per week. For files alone they used 250 tons of bar steel. The output of manufactured goods was as follows: 3,800 large and 39,000 small circular saws; 1,250,000 long saws; 201,500 dozen files, and a large quantity of miscellaneous tools.

A YOUNG Pittsburgher, but an Englishman by birth, has about finished a nail-making machine which is exciting great interest among the few who have seen its operations. It is claimed for the machine that it will cut nails three times as fast as any machine in existence. A Wheeling firm is particularly interested, and a company will probably be formed for making the new machine.

MICHIGAN.

THE Fontaine Locomotive Company has been organized at Detroit. The purposes of this company are stated to be the construction, manufacture and sale of locomotive engines. The amount of capital stock is $1,000,000, of which $600,000 are paid in. The shares are $25 each.

THE Gale Manufacturing Company, Albion, have some 100 hands employed, with a product of $20,000 monthly of plows, wheel rakes, etc. They have recently brought out a new invention of a drop-tooth rake and adjustable handles to plows.

The Eureka Iron Company, of Detroit, is building a new iron casting house for one of its blast furnaces at Wyandotte. Its plate mill capacity for turning out plate and tank iron is 25 tons daily, and its furnace output is 70 tons of charcoal pig iron a day. The company employs 600 men.

ILLINOIS.

A FACTORY for the manufacture of curled hair for cushions out of Florida moss has been built at Pullman. Sixty hands are employed at the factory, and agents are in the South collecting the moss, which is shipped in bales. The manufacturers claim that the article produced is as good for furniture as the more costly hair.

THE Singer Sewing Machine Company are going to establish works at Cairo for making the cabinet work of their sewing machines.

THE Chicago Steam Boiler Works have recently increased their working force to 100 men and have contracts on hand for building ten boilers for firms in various portions of the country.—*Industrial World.*

A NEW corporation, called the McKinney Tubular Rail Company, has just been chartered at Springfield by David Carr Aldrich and other Chicago Capitalists. The capital stock is $1,000,000.

The Bergen Tool Company is the name of a lately organized concern at Batavia for the manufacture of all kinds of fine tools and machinery for special work.

The Illinois Iron and Bolt Company's factory, Carpentersville, manufactures thimble skeins, letter presses, sad irons and blacksmith's tools. It annually consumes 8,000 to 9,000 tons of iron, employs 160 hands whose wages amount to $90,000 a year, and their products aggregate $350,000.

The Chicago Die & Machine Works have just finished for use a number of improved car wheel grinding machines differing in construction from those in use. The establishment is also building several barb wire machines of a new pattern.

INDIANA.

Indianapolis has held a leading position in the manufacture of stoves for a long time, and its future in that respect is now more assured than ever. One firm turn out 1,000 stoves annually. The place is also noted for its saw manufacturing.

The Indianapolis Rolling Mill Company is an old organization. The capacity of the plant is about 125 tons of iron railroad rails per day. The rails made by them rank high. About 300 men are given employment. The company has recently bought additional ground, and are erecting extensive modern buildings thereon for the manufacture of steel rails as well as iron.

An Indianapolis house carries on one of the largest agricultural implement factories in Illinois and occupies an entire square in the city of Chicago. They have a paid-up capital of $600,000, and do an annual business of $2,000,000.

The new malleable iron works at Indianapolis, started by Chicago parties, will employ 500 men. These works are to be especially devoted to the manufacture of the Ewart detachable link belting.

COLORADO.

The Colorado Coal and Iron Co. is turning out 125 tons of steel rails daily for the Denver and Rio Grande Company, and will soon increase its production to 150 tons per day.

Breaking Iron with Dynamite.—The application of dynamite to the breaking up of masses of iron too great to be broken by other means, was successfully tried near Chicago recently. A refractory shunk, "salamander," of twenty tons weight, was placed in a pit. A hole was drilled in the iron, and a charge of dynamite was inserted. Several bars of iron, weighing tons each, were placed over the pit in order to prevent small pieces of the metal from flying heavenward. The cartridge was connected with a battery, stationed one hundred feet from the pit, and after the spectators had found secluded places, the word was given, and in an instant the twenty tons of iron that had previously stood all kinds of hammering, was reduced to fragments. The steel men were completely surprised, and admitted that a feat was performed that before was held impossible.

A very Tall Chimney.—The tall brick chimney of Station B. of the New York Steam Co. is attracting much attention. It is said to be the highest chimney in the United States. When completed the height will be from the foundation 220 feet, ten feet less than the height of the Bunker Hill monument. Its dimensions are at the bottom, outside measure, 32 feet 6 inches by 13 feet, and at the top, 31 feet 10 inches by 12 feet 4 inches. The inner dimensions are 24 feet 10 inches by 5 feet 8 inches at bottom, and 27 feet 10 inches by 8 feet 4 inches at top. The interior enlarges as it ascends. There will be a precisely similar chimney built alongside. Each chimney contains 1,056,000 brick and 700 barrels of cement. The workmen ascend the chimney by a perpendicular iron ladder fastened on the outside. Each chimney is connected with thirty-two boilers, of 250 horse power each. These are on the six floors of the building, which is 115 feet high.

Open Hearth Furnaces.—Open hearth furnaces take the pig iron as it comes from the blast-furnace and decarbonize it, turning out homogeneous iron, which is in reality a low grade, more uniform in character and easier to be worked than iron. The material is taken from a furnace, put in a squeezer, which rolls it into ingots, and is then run through an adjustable roller, which shapes it into the form desired. It is then put into the nail-machines and made directly into nails. Nails that are turned out by this process are to all appearance superior to those known as linch nails, which are made by a more elaborate process, and go also through an annealing process. The application of a hammer curled them up into compact rolls without the sign of a crack, while an ordinary iron nail broke square off at the first attempt. The new steel nails are made by the same machines which make the ordinary nails, and they require no further handling than the ordinary iron nails receive. The long process by which the material is passed through rollers of various sizes is greatly shortened, the ingot being rolled by one application into the required shape.

The Germs of Invention.—Morse, the inventor of the telegraph, invented a traveling register whereby legible indications could be made. Before him persons had sent signals over wires by means of vitreous electricity and by magnetic electricity. Signals had thus been made by means of puff balls, by needles and by sounds; but when Morse appeared with his spring, he had solved the problem of the magnetic telegraph—in other words, he merely put a spring under a lever. Fulton, the inventor of the steamboat placed the spousing beam so as to support the outer end of the paddle wheel shaft; so much and no more. Colt, the inventor of the firearms that bear his name, introduced into his manufacturing the plan of "assembling" the parts, the parts themselves being old. C. Goodyear, by long and arduous efforts, invented soft rubber by adding to caoutchouc, sulphur, and then heating the composition; but after him, in 1852, Nelson Goodyear found out that with the same ingrediants, treated in almost the same way, he could make hard rubber, the valuable invention which has been so useful in arts; and his patent was fully sustained by the courts. By these instances which are only samples, we see that a "great" invention is the matured fruit of well watered and ripened prior suggestions.

American Watches in New Zealand.—In a report on the watch and clock trade of New Zealand, Consul Griffin says that though the introduction of American clocks and watches into New Zealand is comparatively of recent date, they have become so very popular and so general in use that the trade in them bids fair to swell to large proportions. Most of these goods reach New Zealand by way of London. Mr. Bartlett, a leading jeweler of Queen street, Aucland, said to Mr. Griffin: It is difficult to sell an English watch, and as far as the Geneva watches are concerned, they are being fast driven from the market. Everybody seems to want an American watch. I am not prepared to say that American watches are any better than other watches, but it is the fashion to have them. There is not a boy or a servant girl in the country who can raise five pounds who does not want to invest in an American watch. Mr. Bartlett, while acknowledging the popularity of American watches expresses a decided preference for the old fashioned hand-made watch, but frankly admits that his customers do not agree with him.

Definition of a Screw.—Screw, a spiral groove or thread winding round a cylinder so as to cut all the lines drawn on its surface parallel to its axis at the same angle. The spiral may be either on the convex or concave surface of the cylinder, and it is called accordingly either the screw or the nut. The screw can hardly be called a simple machine, because it is never used without a lever or a wrench to move it home; and then it becomes an engine of amazing power and utillity in pressing together substances that have little cohesion, or in raising to short heights ponderous bodies. The smith, the carpenter, the printer and the packer all use screws in their respective occupations. Bales of wool, cotton, hay, etc., may be compressed by means of a screw into packages, the specific gravity of which shall be much heavier than en equal volume of water. Moreover, many of our domestic operations are performed by means of presses or screws, as the making of sugar, oil and wine. The screw possesses one great advantage over the inclined plane, from which its principle of action may be said to be derived. The great attrition or friction which takes place in the screw is useful in retaining it in any state to which it has been brought, and continuing the effect after the power has been removed. It is thus the cabinet maker's cramp, the smith's vice, and all these instruments made by mathematical instrument makers in which screws act can be employed with certainty. Screws are made with threads of various forms: some have sharp, others square or round threads.

The French Metric System.—The simplicity of the French Metric system is all the more admirable that the definitions applicable to one set of measures are interchangeable for another set. The metre is the ten-millionth part of a terrestrial quadrant. It is divided into tenths and hundredths and thousandth parts. The cubic metre has a thousand cubic litres or decimetres, and the cubic decimetre has a thousand cubic centimetres. The gramme is a cubic centimetre of water at four degrees centigrade. The kilogramme, one thousand grammes, and therefore equal to a cubic decimetre or litre. With reference to gasses, the weights are multiples of a crith, represented by a litre of hydrogen gas. All the standards harmonize with our decimal arithmetic, and the measures of length, volume and weight are connected by such simple relations that any one can be readily reduced to either of the other two. Such is the accuracy and the convenience of the metric system, that chemistry in all countries has adopted it, and without explaining the matter further, we may instance its convenience by the ease with which the weight of substance is ascertained upon multiplying its dimensions by its specific gravity.

The Siemens Anderson Steel Patents.—At a recent sale of the assets of the Siemens-Anderson Steel Co., of Pittsburgh, by order of the United States Court in the suit of the Iron City National Bank of Pittsburg against that company, there was sold to the attorney for the bank the interest for the defendants in the celebrated Siemens patents in the United States. The patents cover the Siemans patent revolving furnace, gas furnaces, and processes for making cast steel by the Siemens method. These patents, which are estimated as being worth $500,000, were struck off for $1. The reason why so small a sum was realized was because under the decision of some of the courts of Pennsylvania a patent is declared to be exempt from sale under execution. The plaintiff, therefore went through the formality of attaching and selling the patents and through its attorney buying them, hoping that on appeal to the Supreme Court, the decision of the lower courts relative to their exemption would be reversed, in which case the bank would have a very valuable property for a mere song. This purchase is practically betting one dollar against half a million that the Supreme Court would reverse the decision of the lower courts. This may be one of those bets that are said to be good even if one loses it.

New Explosive Compound.—One of the most important recent improvements in the manufacture of explosive compounds is the manufacture of explosive gelatine, which is being largely used in mining operations in Germany, where it is meeting with much favor. It is obtained by dissolving gun cotton in nitroglycerine, the resulting gummy substance possessing very valuable properties. It is insensible to shock and friction or to higher temperatures, nor does any of the nitroglycerine exude when it is exposed to the action of water. Valuable as this material is, it would seem that a modification in its method of manufacture has made it possible to produce a material which has these important qualities in a still higher degree. A small proportion, 4 per cent., of camphor is added to the gelatine, which had been prepared by dissolving 10 parts of gun cotton in 90 parts of nitroglycerine. It can be cut with a knife, be exposed to temperatures from 120 to 140 degrees F.; it burns freely in the open air, and even if enclosed in a case, and can be exploded only by the use of the strongest detonations, so that special primers are required, composed of 60 per cent. of nitroglycerine and 40 per cent. of a nitrous substance obtained from celluline by a peculiar process.

Cotton Belting.—Cotton belting should be of the best cotton duck, long fibre, closely woven, and unbleached. The best way to make the joints is with a pointed awl, which will push the fibres apart and not cut any of them through. Punch or hollow awl should not be used. If the belt be very heavy it will be well to make a butt joint by lacing on a reinforcing piece over the butt joint.

ITEMS OF INTEREST.

Forty-two iron ships were built in the United States in 1881.

Mr. W. W. Seay, of Rome, Ga., is experimenting with water-melons for the purpose of extracting sugar.

Paper made from strong fibers can now be compressed into a substance so hard that nothing but the diamond can scratch it.

For one mile of railroad it takes 352 rails 30 feet long, 5,250 pounds of spikes, 5,650 pounds of fish plates and 1,750 of bolts.

There are forty-one hat factories in the United States, in which over $3,000,000 is invested, and over $8,000,000 worth of hats made annually.

For the consumption of bituminous coal, 150 cubic feet of air per pound are required; for anthracite 196 feet; for wood, 95 feet.

Among those forwarding cattle from Texas the coming season are five firms with 10,000 to 25,000 head each, and about a dozen firms with 2,000 to 4,000 each.

To prevent ink from damaging metallic pens, throw into either the inkstand or bottle in which the ink is kept a few nails, broken bits of steel pens, or any piece of iron not rusted.

Wood piled in a tank and covered with quicklime, which is gradually slacked with water, is said to acquire great hardness and consistency after the lime has acted upon it for a week or more.

A good rivet, cold, should bend double without breaking. The head should flatten out, when hammered hot, to $\frac{1}{8}$ inch thick without fraying at the edge or breaking. Boiler plates should be caulked with a convex tool.

The Chinese and Japanese build most of their vessels of teak. This wood is very durable, and will stand the water better than any other wood that is used for shipbuilding.

Ceylon, the gem of tropical islands, exports annually upwards of $10,000,000 in value of coffee. Europeans hold coffee lands there to the value of $40,000,000, and the cocoanut plantations are estimated as worth nearly $50,000,000.

According to the London Board of Trade returns, nearly 40,000 tons of fresh beef was imported into England from America last year. The value of this food was $10,000,000, or a fraction of 5d. per pound.

Krupp, the great German gun-maker, has introduced into his works a very novel way of recovering the coils of guns that have become useless. The handle is heated to redness, when liquid carbonic acid is introduced. The cold thus produced causes shrinkage, thereby allowing the coils to be removed.

The next meeting of the National Associatiation of General Baggage Agents will be held at Cleveland, O., August 9. These gentlemen have charge of a very important branch of the service, and their deliberations may result in making it more profitable to the railways than it has hitherto been.

It is thought that the demand for a cheap insulating material has been met by a discovery of a method by which wood, sawdust, cotton waste, paper pulp and other fibrous substances can be converted into a material perfectly impervious to moisture and acids, easily moulded under pressure into any shape, and capable of being worked or cut into any form.

Recent statistics show that the number of paper mills in the United States is put down at 960; United Kingdom, 650; in Germany, 543; in France, 539; in Italy, 206; in Austria, 160; in Russia, 160; in Spain, 63; in Portugal, 19; in Belgium, 29; in Holland, 16, in Denmark, 19; in Switzerland, 15; in Japan, 6; in Greece, 1; in Roumania, 1; in Cuba, 1.

At the recent convention of Master Mechanics at Niagara Falls, Mr. Hayes stated that the cost of oil on his road for the last two or three years had been about thirty cents per one hundred miles. This included all the oils used—the head-light, cab light, engineer and fireman's lamp, signal light, etc. The average for lubrication was about twenty-five miles per pint, leaving lamp and signal out of the question.

The Ohio State Board of Agriculture has certainly done a wise thing in permanently locating the state fair at Columbus which is almost the geographical center of the State, and is quite at its railroad center, having now in the neighborhood a dozen separate lines of railroad radiating in every direction, with new connections constantly being opened. The Board has commenced the erection of new and permanent buildings on the grounds heretofore occupied by its exhibitions, the work of this year embracing a large extension of the power hall, and an entire remodeling on a permanent basis, of the buildings for live stock.

MECHANICAL RECEIPTS AND ITEMS.

Tempering Steel Tools.—Steel tools should never be heated, either for forging or tempering, in a fresh fire unless it be charcoal. If coke is not at hand the fire should be allowed to burn until all the gas is burned out of the coal before the steel is introduced.

To Bronze Alloys.—Boil for a quarter of an hour in the following solution: Pulverized verdigris, 500 grams; pulverized sal amoniac, 475 grams; strong vinegar, 160 grams; water, 2 liters. An untinned copper boiler is used, and the metals are separated from each other by bits of wood or glass.

Chemical Cutting of Brass.—A moderately thick piece of brass may be cut chemically by drawing a line or mark on its surface with a solution of mercury in nitric acid. The acid attacks the copper, and the mercury amalgamates with the zinc, but, as Iron remarks, whether this is the explanation of what occurs or not, the brass becomes as brittle as glass at the place where the line was drawn and may be broken off.

The Preservation of Bronze.—The objectionable blackish coating peculiar to all objects of gun metal, and which makes them look as if they were cast iron, does not consist of sulphurate of copper, as is generally supposed, but of a mixture of coal, sand, etc., with the oxides of bronze. Considerable difficulty is experienced in removing this coating by mechanical means or by washing the surface with reduced sulphuric acid, but an excellent result is said to be obtained by washing the surface with a concentrated solution of ammonium carbonate. By this means a coating of patina is formed which prevents the ugly blackish mass, heretofore alluded to, from making its appearance again on the outside of the metal. Skilled and experienced hands are wanted to perform the operation. If, it does not prove successful, it is said that the Magnus process may be resorted to, which consists in rubbing the surface repeatedly, at intervals of several weeks, with a solution of 20 parts of crystalizing acetic acid in 100 parts of neat's-foot oil. By the protoxides of copper and the oleic acid that arise from this, a thin green coating is produced, which prevents dirt and dust from sticking to the surface of the article, and moreover involves the formation of a coating of patina, without which bronzes exposed to oxidation in the open are never likely to remain in a good state of preservation.

Tinning Metals.—To cover metals with a layer of tin by an immersion process, they are dipped, after being well cleaned in a boiling bath, containing ammoniacal alum, 535 parts; water, 870 parts; protochloride of tin, 31 parts. To cover metals with a layer of tin by means of electricity the following bath is prepared: pyrophosphate of potash, 400 parts; protochloride of tin, 150 parts; water, 560 parts. The anode is an ingot of pure tin (Bansa); the negative is a zinc ingot. Weigler gives the following method: A bath is prepared by leading chlorine through a concentrated solution of tin until saturated. The excess of chlorine is then driven away by heating the solution after adding to it ten times its volume of water and filtering. The pieces which have to be tinned are cleaned in dilute acid, polished with fine sand, washed, and then suspended to zinc wire, are left for ten to fifteen minutes in the galvanizing bath. This method has the disadvantage that the bath becomes charged with chloride of zinc very soon, and that the tin salt must be often added. Hern proposes the following bath: Tartaric acid, 62 parts; water, 3,000 parts; soda, 90 parts; protochloride of tin, 90 parts. The operation is a little longer than by Weigler's process.

USEFUL RECEIPTS.

To Apply Paints.—The composition of paints should be governed by the nature of the material to be painted. Thus the paints respectively best adapted for painting wood and iron differ considerably. The kind of surface to be covered, i. e., a porous surface requires more oil than one that is impervious. The nature and appearance of the work to be done. Delicate tints require colorless oil; a flatted surface, must be painted without oil, which gives gloss to a shining surface. Again, paint used for surfaces intended to be varnished must contain a minimum of oil. The climate and the degree of exposure to which the work will be subjected: thus, for outside work boiled oil is used, because it weathers better than raw oil. Turpentine is avoided as much as possible, because it evaporates and does not last; if, however, the work is to be exposed to the sun, turpentine is necessary to prevent the paint from blistering. The skill of the painter also affects the composition; a good workman can lay on even coats with a smaller quantity of oil and turpentine than a man who is unskillful; extra turpentine, especially, is often added to save labor. The quality of the materials often makes an important difference in the proportions used. Thus, more oil and turpentine will combine with pure than with impure white lead; thick oil must be used in greater quantity than thin oil. When paint is purchased ready ground in oil, a soft paste will require less turpentine and oil for thinning than a thick paste. Lastly, the different coats of paint vary in their composition; the first coat laid on to new work requires a good deal of oil to soak into the material; on old work the first coat requires turpentine to make it adhere; the intermediate coats contain a proportion of turpentine to make them work smoothly, and to the final coats the coloring materials are added, the remainder of the ingredients being varied as already described, according as the surface is to be glossed or flatted.

Lubricators.—In addition to the usual oils and grease the following lubricators deserve attention: 1. Plumbago:—This material is gradually coming into use, and when properly selected and applied it never fails to give satisfactory results. It may be used on the heaviest planers and ocean steamers, or on the lightest watchwork. When applied to delicate machinery the surfaces should be very lightly coated with the plumbago by means of a brush. In this way all danger of grit is avoided. Plumbago seems to be specially adapted to diminish the friction between porous surfaces, such as wood and cast iron. For the cast iron beds of heavy planers it is a specific. 2. Anti Attrition:—Mix 4 lbs. tallow or soap with 1 lb. finely ground plumbago. The best lubricator for wood-working on wood. Excellent for wooden screws where great power is required. 3. Fine Lubricatiug Oil:—Put fine olive oil in a bottle with scrapings of lead and expose it to the sun for a few weeks. Pour off the clear oil for use. Another method is to freeze fine olive oil, strain out the liquid portion and preserve for use. Booth's Axle Grease:—Dissolve $\frac{1}{4}$ lb. washing soda in 1 gallon of water and add 3 lbs. tallow and 6 lbs. palm oil. Heat to 210 degrees Fahrenheit, and keep constantly stirring until cooled to 60 or 70 degrees.

To Preserve Belts.—Belts should not be oiled except when they become extremely hard; and then the oil should be used very sparingly. Oil not only rots the leather, but it causes the belt to stretch. Lukewarm tallow is used for oiling by excellent authority. It is well to add resin when belts run in damp places. It is false economy to use as narrow and short belts as possible in order to save expense. The small amount saved is lost many times over by stoppage of machinery, slipping of bands, extra strain on the shafting and an increased amount of friction, requiring additional driving power, and causing the more rapid wear of belts. Stretching the belt over pulleys too tightly is apt to cause the lace holes to tear out. The more thoroughly stretched the belt is when made the more likely it is to tear when subjected to undue strain. A belt not properly stretched in the process of manufacture will yield readily when tightened over pulleys and used, thus relieving itself of the extra strain above what should be put upon it.—*Wood Worker.*

PRACTICAL MECHANICS.

Manufacture of Steel Pens.

Steel used for making pens reaches the factory in sheets about 2 ft. long by 3 in. wide, and 0.004 inch thick. They are cut into bands of different widths, according to the dimensions of the pen required, the most usual widths being 2, 2½ and 3 inches. The bands are then heated in an iron box, and annealed, when they are passed on to the rolls and reduced to the desired thickness of the finished pen, thus being transformed into ribbons of great delicacy, about four feet long. The blanks are then stamped out from the ribbons by a punching machine, the tool of which has the form of the pen required. The blanks leave the die at the lower part of the machine, and fall into a drawer, with the points already formed. They are then punched with the small hole, which terminates the slit, and prevents it from extending, and afterwards raised to a cherry-red heat in sheet iron boxes. The blanks are then curved between two dies, the concave one fixed, and the convex one brought down upon it by mechanism. The pens, now finished as regards their form, are hardened by being plunged, hot, into oil, when they are as brittle as glass. After cleansing by being placed in a revolving barrel with sawdust, they are tempered in a hollow cylinder of sheet-iron, which revolves over a coke fire after the manner of a coffee roaster. The cylinder is open at one end, and while it is being turned, a workman throws in twenty-five gross of pens at a time and watches carefully the effect of the heat on the color of the pens. When they assume a fine blue tint, he pours the pens into a large metal basin, separating them one from another, to facilitate the cooling. After this process, which requires great skill and experience, comes the polishing, which is effected in receptacles containing a mixture of fine sand and hydrochloric acid, and made to revolve. This operation lasts twenty-four hours, and gives the pens a steel-gray tint. The end of the pen between the hole and the point is then ground with an emery wheel revolving very rapidly. There only now remains to split the pens, which is the most important operation, being performed by a kind of shears. The lower blade is fixed and the upper one comes down with a rapid motion, slightly below the edge of the fixed blade. To give perfect smoothness to the slit, and at the same time make the pens bright, they are subjected to the operation of burnishing by being placed in a revolving barrel almost entirely filled with boxwood sawdust.

To Join the Ends of a Band Saw.

File the ends of the saw on opposite sides to form two wedge-shaped ends, having a lap of, say, from ⅜ to 1½in., according to width and thickness of plate; a thin narrow plate for light work, like ordinary scroll sawing, ¾ in.; a wide saw, say 4 or 5 in. width, by No. 16, 17 or 18 gauge, 1½ in. lap. When the two beveled sides are laid together, they must form a joint of the same thickness as the blade. Now make two pair of tongs with heavy jaws, long enough to cover the width of the blade; have the jaws straight and shut closely; cut a notch in a piece of about 6 by 6 joist for wide saws and smaller for narrow saws; have the notch large enough and covered or plated inside, so that it will not be burned by the hot tongs; now clamp the saw on the joists, so that the laps will come over the notch; the joists should be, say, 4 feet in length, and mounted on legs like a carpenter's saw horse; now cover the lap with the muriate of zinc or borax water, placing a piece of very thin silver solder or fine spelter solder in the joint. If spelter be used it may be mixed with borax water and spread between the joints. (Silver solder, however, is preferable to spelter.) Now heat one pair of tongs a bright cherry red, scrape off all the scale, etc., between the jaws; now clamp the joint to be brazed, using the cold tongs to clamp the points of the hot tongs; hold them a sufficient length of time to melt the solder; have the other pair of tongs warmed to about the heat of a sad-iron; now carefully draw the hot tongs off toward the back of the saw, having the back rest firmly against supports so that the saw cannot move edgewise; have another person follow up the hot tongs with those merely warmed; hold the grip with the warm tongs until the joints are fairly set, when nothing remains to be done more than file off the surplus solder. The above process will be found much better than cooling off the joints with water, as it is liable to harden and crack the blade. The soldering and cooling tongs should be made heavy and strong. The cooling tongs should not be used entirely cold, as the sudden chilling will harden the plate. If the process be properly performed the saw will be of the same temper at the splices as other parts.

INDUSTRIAL SCIENCE.

Boiler Plate.

[By Professor Channing Whitaker, of the Institute of Technology, Boston.]

Let us see how it is that dirt becomes mixed with the metal. The first bars that are rolled from the puddled pig iron are cut into short lengths and packed together in what are known as piles or fagots. These puddled bars may be mixed with scrap iron of any grade in the fagots. Each bar has more or less dirt in its interior, mechanically mixed with the particles of iron, and it has more or less dirt or scale upon its exterior. When the fagot has been again re-heated, and passed through the rolls a portion of the dirt falls off, or if it is within the mass, and if more fluid than the metal it may be squeezed out and leaves the metal cleaner than before, but a part of the dirt still remains attached and mixed with the metal. When the original bars of pig iron, drawn under the rolls, become longer and of comparatively small cross section, the dirt is in the same way drawn out, so as to give the appearance of a grain to the metal. This dirt so far weakens the metal that when rolled into plate, it is sometimes one-fifth stronger lengthwise of the grain than across it. But this is not the worst feature of the case. The heat of the furnace passes through the comparatively clean metal between it and the dirt patch with ease, but, on reaching the dirt patch the flow of heat is checked, the heat accumulates in the metal and only passes the dirt patch when the temperature of the metal of the furnace side is sufficiently in excess of the temperature of the metal on the water side to cause the heat to flow through the dirt patch with sufficient rapidity. In the course of time the continual overheating of the metal on the furnace side of the dirt patch causes it to split away from the metal on the water side, and to bulge, and what is technically known as a blister is formed on the furnace side of the plate. If a chalk mark be made in the surrounding portion of the surface which retains its bright color; the positions and dimensions of the particularly defective portions of the plate can be known with precision, and such portions can be cut off from the rest, and thrown back into the scrap.

The best metal for use in the construction of boilers is ingot iron, and sometimes called homogeneous steel, made by the open hearth process. This metal is extremely ductile and of uniform nature throughout. It is strong and durable and cheaper than the best grades of wrought iron. This process is conducted in the open hearth furnace which is usually a rectangular structure. The hearth or bed of the furnace is scooped out into a shallow dish-like form to hold the metal, and is thickly lined with pure quartz sand. The roof of the furnace is arched and much depressed over the middle of the bed and it forces the sheet of flame which passes straight through the furnace, down upon the surface of the metal on the hearth. There are two openings at one end of the furnace, and two others at the opposite end. The upper opening at one end admits a blast of hot air. The lower opening at the same end admits a blast of hot, combustible coal-gas. These, the air and gas, unite in the furnace producing the flame, which after playing directly upon the metal on the hearth pass out through the outlets on the opposite side. The flame from each outlet enters a different chamber. Each chamber is filled with fire brick laid up cob-house fashion, and as it passes through, it gives up its temperature to the bricks in the chamber. Those first approached become intensely hot; those last reached at the entrance to the chimney, are heated but little. The products of combustion pass into the chimney at the low temperature of 300 to 400 degrees F., for the fire bricks literally sop the heat out of the flame as a sponge sops water. After a time the direction of the current through the furnace and through the chambers filled with fire brick is reversed by the aid of valves. Cold air enters one brick chamber near its connection with the chimney. Comparatively cold gas enters the other brick chamber near its connection with the chimney. Both the air and the gas sweep through them into the furnace, and carry with them the heat which the bricks previously absorbed from the flame, back into the furnace, where it does its part in melting and refining the metal. It then escapes at the orifices through which the air and gas had previously entered and finds itself in two other chambers, also filled with fire brick and communicating with the chimney. They are like the two chambers that have before been described, and like them are called regenerators. Whichever direction, then, the flame has, as it passes over the open hearth, the gas reaches the chimney at the comparatively low temperature of from 300 to 400 degrees F., and the chimney gases carry with them but little heat that is of value, while the extreme heat which the gas and the air, not yet mixed, takes up from the fire bricks makes them so intensely hot that when they do unite they take on a temperature which it is difficult to change.

The Use of Flow-Gates in Iron Founding.

BY CLAUDE WYLIE.

Some molders imagine that the plan of having a great many flow-gates on a surface that is to be planed or turned (not a working part) makes a nice clean casting. We believe that it does tend that way, but not quite so much as is perhaps generally supposed. The casting may be dirty between all the gates, the clean spots showing where the flow-gates were. It is a better plan to allow a little more than the usual margin for planing and have a clean cast, a clean mold, and metal in good condition in the ladle. We should say that these precautions will produce a clearer casting than having flow gates. Hard metal is very apt to draw or subside. Some engineers wish to have castings of a certain kind cast with hard iron. Now, if the thickness of the metal be not uniform, and a heavy part or parts be in the castings these places will be liable to become drawn. With hard iron it may be in a very unlikely place on the casting where the molder could not reach, even if feeding through a flow-gate could have done any good. This probably would not have taken place with ordinary metal. With hard metal the case is very different. We dislike the plan of feeding except in cases where it really cannot be avoided, because we are convinced that it is seldom carried out properly. How often has a good mold been spoiled through a molder's heedlessness in pushing his rod roughly into a mold and thus breaking a core, the metal getting into a vent and blowing the top off. When flow-gates pass through the loam plate, care should be taken to have the hole in the plate made larger than the intended flow-gate, so that some portion of loam may intervene between the plate and the gates. Where there is no loam, and the metal has to flow on the bare plate, the gate may set too soon to feed the casting; besides a strong gate may seriously interfere with the proper contracting of the casting, not to speak of the trouble which is apt to be experienced in taking the plate off when the casting is cool. The same precaution should be observed with regard to running gates, and in green sand or dry sand an inch of sand should be between the bars of the molding box and the flow-gates. Flow-gates are always put upon the highest part of a casting. We scarcely approve of them in any other position unless they are 2½ inches in diameter, so as to rise freely to the level of the head or highest gates. Flow-gates are good when put upon the proper part of the casting. As to their number, the molder may put on as many as he thinks fit; they will do no harm, and not much good, but simply have the effect of giving him a little more labor in putting them there, and of causing more labor to the cleaner in removing them from the casting.

TO BRONZE IRON.—Iron has sometimes to be bronzed for domestic use. The following is a very simple way of obtaining a very good bronze: Mix an equal quantity of butter of antimony and oil of olives; put this mixture on the iron which is required to be bronzed, with a brush, the iron having been previously brightened with emery and cloth, and leave it for several hours. Then rub with wax and varnish with copal.

WIRE FENCES FOR TELEPHONE CONNECTIONS.—It is suggested that the wire fences which bound a multitude of Western farms might be turned into telephone connections at small cost, to the great social advantage of lonely wives whose husbands are away from morning until night.

SCIENCE AND INVENTION.

Gripping Device in Testing Machines.—Messrs. Riehle Bros., of Philadelphia, have recently introduced an improved gripping device in testing machines, which is undoubtedly of interest to those engaged in testing materials. It is particularly well adapted for holding flat specimens of iron or steel, preventing the test pieces from being pulled out of line or torn at the edges. This has always been a difficulty when wedge grips are used for testing purposes, and the new device undoubtedly supplies a long-felt want. It is well-known to those who have conducted experiments with machines for testing tensile strength, that it is of the greatest importance that the clamp which is used to secure the specimen under test in the testing machine should transmit the strain in a direct axial line through the material, without tendency to lateral strains, and this the invention effects.

Electric Tricycles.—It is to the tricycle, in some of the many forms it is now assuming, says an English paper, that we look as the traveling carriage of the future. Within a very short time it has come exteasively into use, and as it is available for ladies as well as gentlemen, and is safe and steady, and comports with dignity, it appeals to a wide constituency. It is well known that one of the first uses M. Faure made of his new discoveries relating to the storage of electricity was to propel a tricycle, and the speed he then obtained was ten miles per hour; and in this connection it appears as though the French, who were the first to introduce the modern bicycle about fourteen years ago, will be the first to manufacture its direct descendent through a clearly traceable evolution, the electric tricycle.

Diffraction Gratings.—Prof. H. A. Rowland, in a notice contained in the Johns Hopkins University Circular, gives some results of a new dividing engine. Owing to an improved method of manufacture a very perfect screw was obtained, and by means of this diffraction gratings, with 43,000 lines to the inch, were obtained. Surfaces $6\frac{1}{4}$x$4\frac{1}{4}$ inches can be ruled by the machines. The screw is practically perfect and has been tested to 1-10,000th inch without showing any appreciable error. Lines were also ruled on concave surfaces, and the gratings obtained allow the observer to dispense with a large part of the telescopic arrangements of a spectroscope.

Cleaning of Steam Boilers.—A recent invention in cleaners for steam boilers consists of a "mud or scum-pipe" provided on its upper side, at intervals of about one foot, with horizontally arranged scum-collecting cuds of flaring shape, communicating with the pipe. The pipe is journaled at either end in the boiler-heads, and is capable of being reciprocated longitudinally in hollow plugs inserted in said boiler-heads, and which construction also admits of lengthwise expansion of the pipe. This pipe and its scum-collecting cups are arranged along the water-line in the boiler, and serves to catch any foreign matter on the surface of the water and convey it out from the boiler, a suitable discharge pipe connecting with the device serving the purpose of drawing such matter off.

A New Stone Breaker.—Messrs. W. H. Baxter & Co., Leeds, England, have invented a knapping motion stone breaker. In this machine the stone is broken by a sudden blow, and not by a slow squeeze as in other machines. The advantages claimed for this method of fracturing stone are two-fold; firstly, the same quantity of material can be broken in a given time with less than half the power required (and, of course, a proportionate saving of fuel); and secondly, the stone when broken is more evenly cubed, with 50 per cent. less waste in small chippings and dust than in other stone breakers, a great desideratum in breaking stone for road metal. It will be seen that the motion is obtained by an ingenious combination of a crank radius link and lever, and as one-half the strain is borne by the dead center of the radius link, the strain on the driving shaft is just one-half less, and the increased lateral motion given to the lifting rods also greatly increases the power of the machine. Besides this, however, the Baxter motion has this superiority, that whereas in other stone-breaking machines the fly-wheel or driving shaft, this completes it, each revolution communicating the neceesary motion of the jaw, in the Baxter machine the blow is given in exactly one-quarter of a revolution, causing the action to be as near an approach to the hand hammer as it is possible to obtain by mechanical means. Having given the blow in one-quarter of the revolution, the jaw remains stationary during the next half of the revolution, and the backward motion is accomplished in the remaining quarter. The jaw going back suddenly, the stone drops down much more readily than in machines which move back more slowly.

Meat Preservation.—A new invention promises to preserve beef or mutton while the animals are still alive. Boric acid is injected into the animal's vein's, the natural circulation of the blood carries the antiseptic through every part of the body, and when the unfortunate animal that thus innocently preserves its own flesh for future consumption comes under the care of the butcher, it will be found that the mutton will keep perfectly wholesome for a considerable period.

Telescopic Telegraphing.—A recent telegraphic experiment, of a singular description, consists of the reading of large silvered letters, a square yard in size, and fixed to a blackened board, by refracting telescopes This method succeeded well at a distance of three miles, and the inventor, an officer in the French service, thinks he will succeed in reading messages at a distance of sixty miles.

New Wood-Preserving Process.—A new wood preserving process has been invented in France by M. Jacques. He first impregnates the timber thoroughly with a simple solution of soap, mixed with an acid—proferably phenic acid. This causes the fermentation, in a few days, within the wood, of a fatty acid, which is insoluble in water, and impregnates the remotest fibers.

Wood Polishing Machine.—A wood polishing machine has been brought out by Almon Bridgman and James L. Perry, of Berlin, Wis., wherein the combination is shown of a sand-paper cylinder, with a presser roll suspended above it in adjustable bearings, and yielding feed-rolls which are adapted to carry the stuff away from the cylinder and against the presser-roll.

Lighting by Electricity and Gas.—A recent English invention is for lighting by electricity and gas combined, the electricity to decompose carbon from a flow of gas, bringing about complete combustion—the result being a clear, white flame.

Protected Pully Band.—A new pully-band for driving machinery consists of an elastic cord surrounded with metalic rings or spirals. The spiral wire serves to protect the elastic cord from abrasion or wear, which would otherwise be very great on cords of this description.

Foreign Oil Wells.—The important oil wells near the Russian town of Baker, in the Caucasus, have come into the possession of a French company, which is managing them on the American system, and a pipe line has been laid to the nearest railway station. The German oil field, in the Luneburg district too, which, under native management was developed in the most primitive manner, has passed under control of an English company, which has applied American methods and imported a number of drillers from Canada.

Oxide in Copper.—It has been noticed that copper, when melted with salt, and subsequently cooled, is much tougher than ordinary copper, this being due, in all probability, to the removal of the cuprous oxide which is generally present in greater or less quantities. It has also been observed that the addition of salt to molten copper has the same effect as poling, and it seems that the determination of the loss of weight after such treatment is an easy and rapid method for the estimation of cuprous oxide present.

Basic Steel Nails.—The plant for the production of basic steel nails, to be erected in Pittsburgh, consists of a blast furnace seventeen by seventy feet, three generating hot blast stoves, eighteen by sixty-five feet, blowing and hoisting engines, a basic Bessemer plant for taking the molten metal direct from the blast furnace, for the production of tubular ingots, the whole so arranged that from the time the ore is placed in the blast furnace until the nail plates are cut suitable for the nail machines the metal is not permitted to get cold. This plant is calculated to produce a minimum production of one hundred tons of nail plate per day.

A Workman's Iron and Steel Syndicate.—The Canadians are looking forward to the speedy development of a great industry, that of iron and steel, an industry, which, they say, "under the care of the protective system, has grown in the United States to enormous proportions." A joint stock company, the "Steel Association of Canada," which owns seven hundred acres of the best mining lands in the Province and the ore of the mine already making from 68 to 70 per cent. One of the excellent features of the association is that all men employed at the works are required to be the holders of at least one share each ($50) of the stock, thus giving them a voice in the management of the business and a share in its profits; by this it is anticipated that the often accurring conflicts between capital and labor will be avoided by the association. The Workingmen's Union of Canada have formed a syndicate and obtained $700,000, and the Government lends itself heartily to the enterprise. The outlook is good, especially as the Dominion yearly imports $12,000,000 of iron and steel goods.

Cleaning and Lubricating Wire Rope.—Messrs. Parrington and Almond, of the Wearmouth colliery, Sunderland, England, have designed and patented a wire rope cleaning and lubricating machine, which has, for some time past, been employed with very satisfactory results at the above colliery. The machine is applicable to flat and round ropes, these passing between a pair of flat wire brushes, the pressure of which on the ropes can be adjusted by a screw: two hoppers are placed below the brushes, in order to catch the dirt which is removed. Lower down, the ropes pass between a pair of revolving brushes, and then between a pair or rollers of soft material, which exert an adjustable pressure. These rollers are geared to the revolving brushes, and cause them to move in a direction contrary to that of the ropes. For cleaning the rope, revolving wire brushes are used, and these, as they rotate, penetrate between the strands of the rope and leave the latter clean for receiving the lubricant. When oil or grease is to be applied, the rotating wire brushes are replaced by strong hair brushes, which are fed with lubricant from feeders above, this lubricant being thoroughly brushed into the outer strands of the rope. The changing of the revolving brushes can be effected very readily, and the brushes act equally well whether the rope is running up or down. It is claimed for the machine described that, from the thorough manner in which the ropes are cleaned, their condition can be more readily and accurately determined by inspection, while, from the systematic manner in which the lubricant is applied, there is a great reduction of waste and a better quality of lubricant can be profitably used.

The Marine Engine of the Future.—One need only reason from current events and contemporary evidence to deduce that the marine engine is rapidly undergoing a change in character which is so radical as to almost make it another machine. The direction of this change is chiefly in the velocities at which it can be driven, which is only another way of saying that it is found that it can be made vastly more powerful by increasing its speed. In itself this is not a discovery, but the possibilities of speed in the pistons of marine engines have only lately been recognized, engineers naturally feared, in years past, to set large masses of iron in motion at high speeds at sea, and not until the screw came in was anything attempted in this direction. Now there is scarcely any limit to the speeds that may be expected. The mere fact that a piston 75 inches in diameter can be worked at 114.7 pounds absolute, and make upward of 700 feet per minute, day in and day out, under all ordinary circumstances, is a fact that speaks with more force than any combination of words or arguments can show, and this is done daily. The marine engine of the future will doubtless be a very much smaller machine than the present one, speaking of its size in feet and inches. Higher pressure in the cylinder and higher velocities in the crank shaft will take the place of lower pressures, larger cylinders, and low velocities. This will be attained by the better workmanship and a better general knowledge of the conditions to be overcome. When boiler making attains to the same perfection as engine making, we may laugh at pressures that now seem impossible and improbable.—*Mech'l Engineer.*

RAILROADS.

The cost of operating our railroads in 1881 was $449,565,071, or 62 per cent. of their gross earnings. The total amount expended in the construction of new lines and in operating and improving the old ones was over $750,000,000—the greater part of this vast sum being paid in wages. The number of persons employed in operating them the past year averaged fully 12 to the mile of operated line, or 1,200,000 in all. The number employed in the construction of our railroads equaled 400,000, increasing the total number of employes to 1,600,000, or about one thirty-second part of our population, estimated at 53,200,000.

The Cincinnati, Hamilton & Dayton Co. have a total mileage of 353 miles. The total capital stock is $3,500,000, and the bonded indebtedness $2,944,000. The report just issued shows the total earnings for the year ending March 31st, 1882, to have been $2,961,446, an increase over the previous year of $79,140. The actual net earnings were $929,782.

The elevated roads in New York now operate 2,350 trains per day, running only one minute apart during the hours.

The number of locomotives on the 104,325 miles of railway in the United States at the commencement of the present year is stated by Poor's manuel as, 20,116, an increase of 2,167 over the number reported one year previous.

The cut of two cents a hundred on east bound grain freight made to certain parties by the Chesapeake & Ohio has been met by the Kentucky Central. Grain rates to the east from Cincinnati are now as follows:

To New York 21 ½ cents per hundred;

To Philadelphia, 19½ cents per hundred;

To Baltimore, 18½ cents per hundred.

The rails of the Valley Railway are now laid to within 50 yards of the Cleveland & Pittsburgh track at Mineral Point. Here a crossing at grade is to be effected, and then the Valley Road will follow the ravine along which runs the Bayard branch of the Pittsburgh Road on its road to New Philadelphia, the two roads occupying opposite sides of the ravine. Whether this crossing is to be effected without serious opposition is unknown; but it looks as though the Pittsburgh folks will resist the attempt. The southern terminus of the road, as hitherto announced, will be at Wheeling Junction, a point previously known as Zoar Station, on the C. & P. road. When the track of the Wheeling & Lake Erie railroad, completed from Massillon through Navarre, Bolivar and Zoar to the junction is completed, it will be of immediate advantage to the Valley railway. So also the accession of the Marietta traffic. The Cleveland & Marietta Railway Company, having northern terminus at Canal Dover, have leased temporarily the use of the Cleveland & Pittsburgh tracks between that village and Zoar station, in order to establish a new and short line between the Ohio River and the Forest City. Upon the completion of the Valley Road, accordingly, Marietta trains will run through to the southern valley terminus. It has been announced as the intention of the Marietta folks to put in the Zoar-Dover link another year. On the portion of the Valley Road between Canton and Mineral Point the passenger business is light, since Mineral Point is a place scarcely as large as Peninsula and the other towns on the line, North Industry, Briggsville (named after Superintendant Sam. Briggs), Sparta and Sandyville, are even smaller. The freight traffic is more considerable, however. Already two coal mines are in active operation, one near Mineral Point and the other near North Industry, and a dozen different parties are now scouring the surrounding country with a view towards developing its mineral interests. Inside of thirty days a third mine will be formally opened, and in forty days a fourth will be ready for business. Many believe that inside of one year there will be eight or ten profitable mines in successful operation along the line of the Valley extension.

THE Southern Pacific Railroad has, it is reported, ordered the construction of 3,000 twenty-ton freight cars.

FOR one mile of railroad it takes 352 rails, 30 feet long, 5,250 pounds of spikes, 5,650 pounds of fish plates and 1,750 of bolts.

THE line of the Cleveland, Toledo & Pittsburgh Railroad (first called Youngstown, Pittsburgh & Chicago) is in a fair state of progress, and it is the intention to have the iron laid in time for the fall business.

COST OF GAS ENGINES.—The very wide application of gas engines to the production of electric light has called out a good deal of ingenuity in their design, but has been much more valuable to the community by inducing a careful investigarion in regard to their economy. In England Professor Ayrton says, in an article upon the subject, that at three shillings (seventy-five cents) for 1,000 cubic feet, the steam engine will be cheaper for driving dynamo machines than the gas engine. In making this statement, however, Professor Ayrton is, we believe, only considering an engine indicating twenty horse-power. He says, however, that if a cheap heating gas can be obtained, say, one costing twenty cents per 1,000 cubic feet, then the gas engine would be the cheapett. He has made some interesting figures in regard to the cost of horse-power in portable and semi-portable types of engines such as are most commonly used for driving dynamo machines. He estimates that these engines would, in a competition, consume about four pounds of coal per indicated horse-power per hour, but he thinks that they use from six to seven pounds per horse-power per hour in ordinary work. This is objected to by some of the English manufacturers, who say that they are ready to produce a horse-power for three pounds of coal per hour in engines indicating only forty horse-power. The probabilities are that four pounds would be more nearly correct in actual practice than the lower figures named by the manufacturers. If coal sells at $5 per ton, which may be called a fair average price, this makes the cost of a horse-power for fuel one per cent. per hour. The best performance of a forty horse-power gas engine is said to be 20 cubic feet of gas per horse-power per hour. With the ordinary price of gas in New York City, say $2.50 per thousand, this would make the cost of one horse-power five cents per hour.

CABINET WOODS.—One New York firm handles most of the fine cabinet woods imported into this country. These are received in great variety, and of very fine quality, especially in veneers. The firm has an improved machine for cutting up the logs, which slices off boards up to five-sixteenths inch thick and eight and a half feet long as fast as two men can handle them. No planing is required, the knife leaving the surface as smooth and solid as if sawed. The logs are steamed before cutting, to soften the fibre and make it more yielding. The boards are dried in a few minutes by a single process which combines steam heating and hydraulic pressure.

AMERICAN CUTLERY.—Good testimony is given by the London Irongmonger to American cutlery. It says: "About the only advantage which English cutlers can claim over American competitors is that which attaches to the traditional reputation. It is a mistaken notion that the former have any advantage over the latter in the matter of steel. American steel made for cutlery and tool purposes is as good as any steel made in Great Britain, and it would be folly to question the fact. The art of steel making has been brought to great perfection in Pittsburgh, and while it is true that some old houses consuming steel still prefer and use the English, it is as much because they are unwilling to make any change in material and methods as because they consider English steel really better." While thus admitting the excellence of our material, this writer says that in "finish" our best specimens of cutlery are certainly "unsurpassed by the choicest Sheffield goods."

AMERICAN WEALTH.—Several articles have recently appeared in the English papers on the growing wealth of the United States. The Tines says: "The wonderful wealth-producing power of the United States defies and sets at naught the grave drawbacks of a mischievous protective tariff, and has obliterated almost wholly the traces of the greatest of modern civil wars. What is especially remarkable in the present development of American energy and success is its wide and equable distribution over the shores of the Atlantic and Pacific, along the chain of the great lakes, the valley of the Mississippi, the coasts of the Gulf of Mexico, where the creation of wealth and increase of population are signally exhibited." Another paper says: "With high wages Americans have been able to complete with us in the markets of the world. Should wages considerably decline, the United States will become a formidable rival not only of England, but of Europe.

ABSORPTION OF METAL BY TIN.—When an alloy of lead, tin, or other metal is made with sodium in a melting pot, great care must be used in subsequently freeing the melting pot of every trace of sodium before using it for melting tin in with a view to tinning copper or bronze articles, otherwise these articles when placed in the melted tin will be rapidly eaten away. This has been recently proved by accident, but it might have been expected from known facts concerning sodium alloys, which were long ago pointed out by Mr. Mallet, who showed among other things that if a strip of iron be coated with sodium amalgam and dipped into a pot of, say molten tin, the iron will disappear faster than it can be put to the bottom of the pot.

NAILS.—Many persons are puzzled to understand what the terms fourpenny, sixpenny, tenpenny, mean as applied to nails Fourpenny means four pounds to the thousand nails, sixpence six pounds to the thousand nails, and so on. It is an old English term meaning at first tenpound nails (the thousand being understood); but the old Englishman clipped it to tenpenny and from that it degenerated until penny was substituted for pounds. So when you ask for fourpenny now a days you want those which will weigh four pounds. When a thousand nails weigh less than a pound they are called tacks, etc., and are reckoned by ounces.

At Belleville, Canada, opposite Oswego, there are valuable ore lands containing 65 to 75 per cent. pure metallic iron, and to work which the Steel Association of Ontario has been organized, and works are to be erected at once. It is expected that the iron will find its chief market in the States. The officers and directors include several American gentlemen.

It is rumored that $20,000,000 of English capital will soon be invested in the mineral lands of Arkansas and Missouri.

THE CHANNEL TUNNEL.

An official inspection of the work done thus far on the proposed Channel Tunnel, to form a submarine communication between England and France, took place a few days ago, the object appears to be to overcome predjuces formed against its further prosecution. Many distinguished personages were present. The present length of the driftway completed by the English engineers was stated to be about 1,900 yards. This increased distance is marked by increased moisture in the substance of the gray chalk, which, however, still cuts as clean and as solid as ever. The dampness is truly expressed by the word moisture; for as to weeping even of the joints in rocks, there is hardly anywhere any sign, and there is neither pump nor drain to carry off any water. The driftway was lighted at long intervals by single electric incandescent lights, and although there are fully twenty workmen below ground besides the numerous visitors inspecting, and although the drilling machine was but little worked and the quantity of compressed air therefore given out in the drilling was not very much, the tunnel was perfectly well ventilated.

Our English accounts say that so long as the line of the thick strata of the gray chalk is adherred to, so long apparently will there be no difficulty in prosecuting the English moiety of the perforation of the Channel Tunnel, and when, as in a fortnight's time, Colonel Beaumont will have his compressed air locomotive, which has been built for carrying the debris from the drill of the out-put shaft, let down below ground, there will be interesting evidence of the superiority of compressed air to fire and steam for the future business of driving the trains through the Channel Tunnel itself—if ever it be permitted to be completed.

SHIPS VS. PORTS.

The target practice on the Egyptians at Alexandria is just in time to give a few lessons in modern gunnery to our naval appropriation committee and legislators in Washington. Petty amounts, doled out in a niggardly spirit, for our natural defences are of no account whatever. They merely beguile the public into a false sense of security, and utterly fail of their purpose. Impregnable floating war engines are wanted on the one hand, both for cruising and harbor defence. And auxiliary to these, the pre at all events will not fall far short of, the magnificent results of last year.—*London Mercantile Gazette.*

REFORM IN SCHOOL INSTRUCTION.—Children learn easier than men. Boys become efficient in mechanical affairs much quicker than older persons. Few boys but take an interest in mechanical operations and are found anxious to have the use of tools and appliances. The genius for making something is latent in every childs nature. Then why take the education of the child away from all this natural inclination, away from all this practical part of life and instil into his mind false ideas of the importance of purely literary or metaphysical abstractions Not all children should be mechanics. But no one is injured by knowing something of mechanical appliances, and by educating the eye and hand as well as the memory and reasoning faculties. Children succeed as men best in what they have a taste for and should be given the insight into practical affairs and be allowed to choose their pursuit.

MINES AND MINING.

The large volumes of air produced in some of the deep pits of Great Britain with furnaces are the chief illustrations used by those who still favor furnace ventilation, as the best and most economical. At a late examination of mining engineers before the English Commission on accidents in mines, the following facts with respect to the volumes produced by furnaces in some English pits, were brought out. At South Hetton and Murton, from 380,000 to 440,000 cubic feet per minute are obtained by three furnaces and twelve boilers. A single furnace to aid a fan at West Houghton, in Lancashire, gave from 120,000 to 150,000 cubic feet per minute. At the deep pit, Rosebridge, 235,000 cubic feet per minute are given by two 9-foot furnaces, while at Wynnstay 200,800 cubic feet of air are obtained by one large furnace.

We have very satisfactory reports from the Canada Consolidated Gold Mining Company, whose extensive works and mines are at Deloro, Ont. The works, after the usual delays in getting new machinery into working order, has made a trial run of about a dozen tons of ore. The crushing in Cornish rolls, the roasting in revolving cylinder, and the chlorination in the Mears chlorinator, were all very successfully accomplished. The ore, assayed in ton lots, ran much above the averages found in the original thorough tests of the property, and given in the engineers' reports. The chlorination was also more successful than then counted on, the tailings showing an extraction of about 95 per cent. Since every operation in the treatment of these ores has now again been successfully performed, and the good quality of the ore again demonstrated, there appears no question of the success of this enterprise. It is proposed to increase the roasting and chlorinating capacity to equal that of the concentrating mill. The Plattner and Mears methods of chlorinating will be thoroughly tested, and their relative advantages demonstrated. Upon the results of these practical tests under identical conditions will depend the final adoption of one or both of these processes. A few months more should give the company substantial returns.

The New York Mining Record says of the New York mining stock market: Fairly active and firm, briefly and correctly describes the character and tone of the market during the current week. Not only has a large and well distributed business been in progress, but values generally have shown steadiness, with a tendency in many instances toward a higher range of prices. In short the improvement noted during the past two weeks has been retained with many encouraging indications, and there would seem to be good foundation for predicting not only further improvement but greater activity within a short period. Many of the substantial dividend paying stocks are now selling at comparatively low figures, while others with values of a more or less speculative character would seem to offer inducements to the careful operator. Fluctuations, although frequent and at times rapid, with the usual irregularity of a fairly active market, have not been of an unhealthy character, yielding with elasticity and reacting with more or less inherent strength. Indeed, the market throughout has been one to encourage an increasing business, to inspire confidence and beget a disposition to embark in fresh operations. It is all the more satisfactory that the change has been gradual, brought about as it has been, as the result of healthy reaction after a long period of disheartening reverses and somewhat stormy experiences.

Iowa has an immense iron ore deposit, sufficient to supply the world's demand for this useful metal for a thousand years to come, has been recently revealed. This mineral wealth lies beneath the Lansing ridge in Allemakee county, about 80 miles north of Dubuque. The vast deposit is more than 400 acres in area and over 200 feet in depth. Scientists have investigated its claims, and assays show a percentage of 65 per cent. Deeper down the ore, is without doubt, richer even than this. Experienced iron men of Wheeling, W. Va., have examined specimens and pronounce them excellent, The character of the mineral is that of a hematite or sesquioxide of iron. Numerous soft water springs issue from the bed, and large quantities of St. Peter's sandstone exist in the locality. Here would seem to be a mine of wealth, a genuine bonanza awaiting the advent of capital, enterprise and skill to establish an industry that would redound in fortunes to all concerned. The only drawback is the want of fuel in the immediate vicinity. But fortunately, from the deposit to the Mississippi river, which is not far off, there is a continuous down grade. The ore can therefore be easily taken to the water and then floated in barges to Dubuque to be smelted. If thought advisable, smelting furnaces might be established in the Turkey river district, where an abundance of the best wood is found; or for that matter, anywhere along the banks of the river on either side of the river for a distance of more than 75 miles. Furthermore, a railroad connection of not more than three miles would place the valuable freightage in the hands of the Waukon railroad. By water or rail, the grade is downward, so that under any circumstances the transportation would be of the easiest kind.

The Lake Superior Native Copper Works, located at Houghton, Mich., commenced operations under the present management on September 1, 1880, and have won the reputation of producing the best rolled copper of all kinds now upon the markets. The supply of raw material is obtained exclusively from mines in that section of the country, and owing to careful and skillful manipulation the products of the works have become appreciated in all markets. This is shown by the fact that during the short time the company has been doing business, the demand for its products has increased to such an extent as to necessitate the erection of a new rolling mill of double the capacity of the present one. The new building will be situated a little to the southeast of the company's smelting works, and will be supplied with all modern appliances for the rapid and economical transformation of the native metal into the manufactured article, thus placing the establishment on a level with other rolling mills in the United States. The smelting building, the erection of a cupola large enough to run the slag from three furnaces has been contemplated and will be carried out in a short time. The supply of copper ores is drawn from the Wolverine mine, which from present indications is said to be one of the richest copper deposits on Lake Superior. Work was commenced on this mine in September, 1881, and up to the present time shafts Nos. 1 and 2 have been sunk to a depth of 85 feet. The copper obtained in sinking these shafts has amply repaid all the expenses of the mine. An adit is being driven from the surface to shafts Nos. 1 and 2, by means of which the mine may be drained of all surface water. Between the shafts large quantities of copper have been taken out. Shaft No. 3, containing rich copper bearing lode, has been started, and it is expected that it will be sunk to the adit level by August. The distance between the shafts is 400 feet. All the necessary hoisting machinery is in place, and a stamp mill will be immediately erected capable of treating the product of the mine. The construction of a railroad from the mine to the present location of the stamp mill is contemplated, the necessary survey having already been made. The railroad will run almost entirely through the property of the Wolverine mine, and the total length of the level portion is about 3,000 feet, with a fall in the whole distance of 40 feet. The total length of the incline will be about 1,400 feet, with a fall of 200 feet. Three branches of the Trap Rock River can be brought into the mill and will furnish all the water required at the height of 40 feet above the wash-floors. The distance from which the water will have to be brought by means of troughs will be about 2,000 feet, and it is thought that a more desirable site for a stamp mill could not be found on the range. The two industries above mentioned will be worked co-operatively, and with a mine which gives every promise of becoming one of the richest on Lake Superior, and an abundance of mill facilities, will undoubtedly result in the establishment of an extensive and profitable manufacturing industry.

MARKETS.

Office of TRADE REVIEW AND WESTERN MACHINIST.

FRIDAY EVENING, August 4.

FINANCIAL.

In our local money market there has been an increased volume of business during the week, with liberal shipments of money to the country. Rates of discount are steady at 7@8 per cent. in bank, and outside for prime paper. On prime collaterals, call loans are made at 5 per cent. and time loans at 6 per cent. Eastern exchange meets a fair mercantile demand, but the supply is large and the market heavy. Dealers buy commercial bills at 1-10 discount

NEW YORK.—Confidence in the permanency of stock speculation has increased; loans at six months have been made on choice collaterals at 6 per cent.; it is believed that there will be no call for a settlement in cash of the trade balance with Europe; stocks have been marked by fluctuations but final figures show some gains; a notable exception is Lake Shore, which closes at $1.15¾.

IRON ORE.

There is no apparent disposition on the part of buyers to make purchases, while holders make no effort to sell.

IRON.

There is a moderate activity in the market but prices are firm, and with the bountiful crop in prospect, transactions are certain to be greatly stimulated. Buyers, nevertheless, continue to purchase in small lots, and sellers, on their part, do not care to push sales. Pig iron is unchanged. Foundry irons are scarce and prices have a slight upward tendency; best brands command higher figures We quote Foundry No. 1 X, $25@$26; Fouadry No. 2 X, $23@$24; Gray Forge, $22. For Scotch Iron there is an active demand, and prices tend to an advance. We quote Eglinton $23.75@$24; Carnbros and Glengarnock, $25; Langloan, $26.50@$27; Coltness, $27@$27.50, and Summerlee, $26.50. The market for steel rails is very quiet and not easy to quote. Sales of small lots are noted at $49 to $50 per ton at mill for heavy sections and $51 to $52 for light rails. Large orders could probably be placed lower. The present week is almost a dead week as far as business is concerned. Iron rails are dull and nominal at $44.50 to $48, according to weight of rail. Spikes are unchanged at $3 to $3 10 per 100 lbs.; fishplates, $2 50 to $2 60; track-bolts, $3.75 to $4. Old iron rails are more active, and Philadelphia quotations are $26 50 to $27 per ton for tees, and $28 for double-heads. There is an active trade in plate and tank iron and prices are firm.

CINCINNATI, July 31.—(Reported by Rogers, Brown & Co.)—A steady demand has characterized the Pig Iron market through the week and an active business has been done at current prices. While the tendency has been towards stiffness in prices, there is no quotable change to note. A careful calculation based on direct information shows the Southern Coke furnaces to be sold, in the aggregate, 75,000 tons ahead of the production, with yards entirely bare of stock. Much of this, however, goes to supply the wants of consumers for months ahead, who will, to that extent, be kept out of the market. In the Mahoning Valley stocks are much reduced and the majority of the furnaces have sold from one to four months ahead. We quote for cash: Hot blast foundry—Hanging Rock CC. No 1; $26.50@$27.50; No 2, $26@$26 50; Southern, No. 1, $24@$26.50; Strong Coke, No. 1, $23.50@$24 50: No. 2, $22 50@$23.50; No. 3, $21.50@$22.50; Soft Stone coal, No. 1, $22@$23; No. 2, $21@$22. Forge—Strong, Neutral No. 1, Mill, $21@$22; Cold Short, No. 1 Mill, $20@$21. Car Wheel and Malleable—Hanging Rock Cold Blast, $32@$34; Hanging Rock Warm Blast, $26@$29; Southern Car Wheel Iron, $32@$36; Lake Superior do. $30@$33; Lake Superiar Malleable, $30@$33.

CINCINNATI, July 31.—(Reported by E. L. Harper & Co.)—The market rules buoyant and vigorous, prices continue very firm and are crystalizing into another 50 per cent. advance, which definitely marked the transactions of last week. The transportation of the largest wheat crop the country has ever produced necessarily gives an impetus to railroad interests, and buyers of the varied grades of Pig Iron entering into railroad equipments are preparing for a large business. The foundries and machine shops are exceedingly busy, and favorite brands of No. 1 foundry irons are scarce, consequently the prices are materially higher.

COPPER.

Copper continues quiet, and outside brands of Ingot copper are being offered at very low rates. Prime lots of heavy cut copper have sold at 17¼@17½c; and heavy and light mixed at 16½c. Values are nominally quoted at 18½ to 18½c for Lake Ingot and 17½ to 17¾ for Baltimore, but there has been very little disposition to buy either spot or futures. London has ruled a little higher, the last cable quoting Chili Bars £68,10.

LEAD.

There is a fair demand; the market has ruled quiet, but supplies are firmly and steadily held, there being no disposition to advance prices, as foreign brands are offered at 5½c. We quote solid, 4½@4¾; solid Tea, 4½@4¾; Refined is worth $5.15@$5.22½.

TIN AND TIN PLATES.

The advance in tin has been fairly sustained, there being a good consumptive demand. Apart from improvement in business, the Suez Canal complications tend to strengthen prices. Tin in the London market after declining to £103 15s, advanced to £105, with a strong upward tendency under the influence of large purchases for consumption. We quote for round lots Banca, 28c; Straits and Malacca, 25 to 25¼; Billiton, 25 to 25¼; Australian, 24¾ to 25; English L. & F. 24½ to 24¾; and English Refined 25¾. For tin plates the demand is moderate but foreign advances give firmness to prices.

SPELTER AND ZINC.

Common domestic spelter is drooping and we quote for same 5¼c. Silesian is held at $5.50@5.60; Bertha Refined is 8c and Bergenport 9½c. For sheet zinc there is a moderate inquiry, sales being effected at 7¼@7½c.

ANTIMONY.

A steady jobbing trade is being done in this article at 18½@18¾c for Cookson and 11¼11¾c for Hallett.

HARDWARE.

Trade maintains a healthy tone and business is more active than usual in this season. Stocks of builders' hardware and mechanics' tools are greatly reduced, this inducing great firmness in prices; farmers are beginning to be extensive buyers; prices along the whole line are firm and from now onward a large business is looked for. A strong demand continues for nails, and stocks everywhere are light. We quote, on a very strong market, $3 40 net per keg for 10d to 6d, in large lots, and for small orders an advance of 10@15c per keg. The Enterprise Manufacturing Company, of Pennsylvania, and the American Machine Company of the Mrs. Potts Patent Sad Irons announce that the published discount from list of 35 per cent. to retail dealers will be henceforth strictly maintained by them. In blacksmiths' and carriage makers' supplies the demand is large and prices steady; shelf hardware is in good demand; manufacturers of hardware are beginning to turn their attention to fall stocks; there is an especial want of full assortments of mechanics' and builders' tools. The Penfield Block Company, Lockport, N. Y., have issued a revised list of their specialties.

LUMBER.

The country yards have been ordering freely, being generally quite run down in stock. Prices are firm and advancing and any very material concessions are not to be looked for. Altogether the cargo market is in a most healthy and prosperous condition, Hard woods are held at firmer rates; of the better grades receipts are comparatively light; Chestnut as a finishing wood is coming into demand. Maple, ash, and cherry are firm in price, although not decidedly brisk in changing hands. Mahogany has arrived in fair quantities; there is an active demand for this wood.

SAGINAW.—It is complained that there is little good stock offering, most of the mills having made contracts ahead. Under inspection the cargo quotations are: Shipping culls, $7.25@$10; common, $14.50@$20; three uppers, $35@$40; the bulk of the transactions are reported at $8.50, $17 and $36@$38, $9. $18 and $33; lath are firm at $2.10; Norway bill stuff is quoted at $10@$11; considerable ash and oak lumber is being moved, and about 12,000,000 feet will be shipped from the river this season; shingles are unchanged. We quote XXX at $3.70@3.90 and clear butts at $2.40@$2.75; lumber freights are also dull.

WOOL.

The market is steady but opinions differ as to the immediate future. The receipts of wool at the seaboard markets are large, yet large quantities are held back in the country. In Boston sales of Ohio fine delaine have taken place at 44@46c.

Cleveland Wholesale Prices.

HARDWARE.

Adzes.

Carpenter's	per doz	$18 40
Ship	" "	18 75
Heavy railroad	" "	19 50

Axes.

Hunt's	₱ doz	$ 9 50
Lippincott's Crown	₱ doz	9 00
Cut More	₱ doz	9 00
Peck's Double Bit	₱ doz	22 00
" Champion Blade	₱ doz	11 00

Anvils.

Eagle, Amer.	per lb. 10c dis 20
Wright's	10¾c@11c
Armitage's Mouse Hole	9¼c@9¾c
Trenton	10¾c
Wilkinson's	10¾c

Anvil Vise and Drill.

Millers Falls Co. $28	dis 20
Cheney Anvil and Vise	dis 25&2

Vises.

Solid Box, list of July 1, '79,	dis 35
Solid "Crown" (A. H. Hilldick)	40 to 400 lb. 15c net
Solid, Peter Wright's	15½
Solid, Wilkinson's	14½
Parallel, Parker's	dis 40
Saw Filers, Hopkins'	₱ doz $17.50, dis 10
Reading	dis 45&10
Cowell Hand Vises	dis 20
Richardson's Vise and Anvil	dis 25

Augurs and Bits.

C S cut augers	dis 40&10
do do do bits	40&10
D C gimlet do Ives	dis 50
Snells bits	dis 40
Russell Jennings' augers	dis 16⅔ &10&10
Cook's pat augur	40&10

Animal Pokers.

Berea, per doz	4 00
Eagle, per doz	6 00

Apple Parers.

Domestic & Reading	₱ doz $7 50
Turn Table	9 00

Bolts.

Machine	dis 60
Bolt ends	dis 60
Plow	dis 50
Plow, R. B. & W	dis 40
Cast Iron Barrel Shutter, etc	dis 50 &10
Cast Iron Chain (Sargent' list)	dis 60&10
Ives' Pat. Door Bolts	dis 50
Wrought Barrel	dis 55&10
Wrought Square	dis 55&10
Wr'g't Shut'r, all iron, Stanley's list	dis 50&10
Tire, R. B. & W., new list	dis 70&10
Stove, American Screw Co.'s	dis 40
Bolt Ends	dis 60

Bellows.

	Dis
Blacksmith's com new list, 45 ₱ ct	
Moulder's new list, dis 25 ₱ cent	
Hand, new list, 25 per cent	

Butts.

	Dis
Wrought brass	65&10
Cast, loose joint	10&10
Pin, japanned and silver tipped	45&10
Wrought, fast joint narrow	40&10
Wrought fast joint broad	40&10
Wrought loose joint broad	45&10
Wrought table and back flaps	40&10
Loose joint, reversible	45&10

Cleveland Stamped Elbows

Genuine Russia Iron

4 inch	per doz	4 50
4½ do	do	5 50
5 do	do	7 50
5½ do	do	8 50
6 do	do	9 50
do	do	11 00

Planished American Russia Iron

inch,	per doz	4 00
4½ do	do	5 00
5 do	do	6 50
5½ do	do	7 50
6 do	do	8 50
do	do	9 50

Charcoal Iron

4 inch,	per doz	2 00
4½ do	do	2 50
5 do	do	3 50
5½ do	do	4 00
6 do	do	4 50
7 do	do	5 50

25 per cent

Chisels.

Hot and cold cutting	₱ lb 30
Railroad track	30
Machinists	30
Mallet head	50
Cape	50
Packing	50
Stone cutters	50

Crowbars.

Cast steel	₱ lb 8½
Iron, steel points	6½c

Cutlery, Pocket and Table.

Meriden Cutlery Co., table	net
Am. Miller Bros.' Cutlery Co	dis 25
Humason & Beckley, pocket	33⅓
Naugatuck Cutlery Co.	list net
Aaron Berkenshaw's pocket	dis 25

Coopers' Tools.

Bradley's	dis14@20
Barton's	dis 20

Chains.

Coil by cask,

3-16	¼	5-16	⅜	7-16	½
10¾	9	8	7	6¾	6¼

Drills and Drill Stocks.

Blacksmiths', each	$2.50 dis 10
Blacksmiths', self-feeding, each	7.50 dis 20
Breast, P. S. & W	dis 20&10

Drawing Knives.

Witherby's	dis 65@10
Nobles Mfgr. Co	15
Adjustable handle	20

Emery and Emery Paper.

Regular Numbers	₱ lb 6c
Flour and F. F	₱ lb 4c
B. & A. Emery Paper	dis 30&5

Enameled and Tinned Ware.

Kettles	dis 50
Sauce Pans	dis 25
Tinned Sauce Pans	dis 50

Files.

Auburn	$5 to £ dis 35 pr cent
E. M. Boynton's, new list	dis 25
J. & Riley Carr	4.50 to £
Johnson & Bro	dis 30
Butcher's	4.50 to £
Walter Spencer & Co.'s "Diamond"	4.50 to £.
Fisher's	4.75 to £
Moss & Gamb's	4.50 to £
H. Disston & Sons (new list)	dis 40 per cent
Heller Bros.' Horse Rasps	dis 25
Nicholson	dis 40
New American	dis 40
Union File Co	dis 40

Grindstones.

Ohio	1½@1¾ ₱ lb
Nova Scotia	1¾@1¾ ₱ lb

Hammers.

Maydole's	dis 15
Cheney's	dis 25
Hartford Hammer Co	dis 20
Humason & Beckley	dis 50
Verree	dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75,	dis 25&10
Nelson Tool Works	dis 40&10
Warner & Noble's	dis 5
Kip's	dis 15
Yerkes & Plumb	dis 15
Wilkinson's Smiths' 11½c ₱ lb	net

Hatchets.

Yerkes & Plumb:--Shingling,

Nos 1, 2, 3,

₱ doz $7 50, $8 00, $8 50, dis 25

Claw,

No- 1, 2, 3,

₱ doz $8 25, $8 75, $9 25, dis 25

Lathing,

Nos 1, 2, 3,

₱ doz $7 50, $8 00, $8 50, dis 25

Nails.

20 to 60d	3 40
8 and 9d	25
6 and 7d	50
4 and 5d	75
3d	1 50
2d	2 75
3d fine	3 00
2d fine	3 75
¾ inch	3 00
4d barrel	1 00
1¼ inch barrel nails	1 50
1¼ do do do	1 75
1 do do do	2 50
¾ do do do	3 00
Cut spikes, all sizes	25
Clinch nails, all sizes	1 75
Casing and box nails 75 cts advance	
Finishing nails, $1 25 do	
Tobacco nails, 50 cts do	

Nuts and Washers

Nuts, square	7c off list.
Nuts, hexagon	6c. off list.
Washers	6c off list.

Picks.

Railroad, 4 to 5 lbs	doz	$7 75
5 to 6 lbs		7 75
to 7 lbs		8 50
7 to 8 lbs		9 50
Railroad Tamping Pick 7 to 8 lbs	doz	13 50
Mill Picks per lb		75c

Rivets.

Iron	dis 40
Tinned	dis 40
Copper	dis 33⅓

Squares.

	Dis
Steel or iron, case lots	50
Try squares and T bevels	40

Spikes—WROUGHT

All lengths by ¼ inch	4½c
do do do 5-16	3½
do do do ⅜, 7-16 & ½in	3¼

Shovels and Spades.

Ames' new list, July 1, 1881,	dis 15
Old Colony	dis 15
Remington's (Lowman's Patent)	dis 30
Rowland's	dis 40 and 10
Griffiths	dis 40&10

Saw Sets.

Boynton's patent X Cut, per doz $12; Hand Saw, per doz $10.	dis 20
Stillman's Genuine, per doz $3 50 and $5 50	dis 20
Stillman's Imitation, per doz $3 25	dis 20&10
Common Lever, per doz $2	dis 20&10
Leach's No. 0 $8; No. 1 $15;	dis 15
Hammer, Hotchkiss $5 50,	dis 10
" Bemis & Call Co.'s new patent	dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer	dis 30&5
Bemis & Call Co.'s Plate	dis 10
" " Cross-cut	dis 12½
Aiken's Genuine	$13, dis 50&10
" Imitation	$7, dis 50
Hart's Patent Lever	dis 20
Disston's Circular	dis 40

Sad Irons.

From 4 to 10 lbs	per lb 8¾ net
Self-Heating	₱ doz $9 net
" Tailors	₱ doz $18 net
Gleason's Shield and Toilet	dis 25
Mrs. Pott's Irons, double pointed	dis 35
Mrs. Pott's Irons, square back	dis 35
Enterprise Star Irons	dis 40
Combined Fluter and Sad Iron	₱ doz $15, dis 15

Scales.

Hatch, Counter, No. 171	₱ doz. $42, dis 37½&10
Union Platform	66, dis 45
Fairbanks'	dis 20
Buffalo Scale Co	dis 20&5
Forsyth Scale Co	dis 25
Howe's	dis 20&10
Chatillon's Eureka	dis 25
Family Universal	dis 50
Scale Beams	dis 33⅓&10

Bag-Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Planes.

Ohio Tool Co	dis 25
Sc ota	dis 3
Bailey's Pat. Adjstble	dis 20@25

Rules.

Stanley	dis 66⅔ and 10

Sash Locks. Discount.

Payson Mnfg. Co. "Perfect"	42
Simmons' Sash Supporters	20

Hinges.

Champion double acting spring hinges	dis. 30
Screw & Strap 8@12 in.	30. net
Gravity Locking Blind Hinges, Sargeant & Co.	70&10

Screws. Dis

Flat head iron or steel	per cent dis. 30
Flat head brass	30
Round head iron or steel	25
Round head brass	20
Brass and Silver capped	40
Japanned, list of Plain Screws	20
Coach, patent Gimlet point, list per 100	60
Lag, taper points	60
Bed	10
Machine, flat head, iron	55
round head, iron	50
Bench, iron	55&10
wood, beech, per doz $3	10
wood, hickory	20&10

Valves. Dis.

Jenkins' Patent Gate Valves	35
" " Globe "	40
" Standard Packing "	20

Wrenches.

Coe's genuine	40 & 10
Coe's imitation wrought bar	60
Mechanics'	60 and 10

Wire.

Brass and Copper	dis 20
Bright & annealed, Nos. 0 @ 18	dis 50@52½
" " Nos. 19 @ 26	dis 60
" " Nos. 27 @ 36	dis 65
Coppered Nos. 0 @ 18,	dis 45
Galvanized, Nos. 0 @ 18, market list,	dis 40@42½
Tinned, Nos. 0 @ 18,	dis 40@45
Cast steel	dis 40
Tinned Broom Wire, Nos. 18 @ 25	dis 55
Annealed Fence, Nos. 8 and 9	dis 55@52½
Annealed Grape, Nos. 10 to 14	dis 52½
Galvanized Telegraph, Nos. 7 to 9	₱ lb 7¼c
Galvanized Telegraph, Nos. 10 to 11	₱ lb 8¼c
Galvanized Telegraph, No. 12	₱ lb 10¼c
Fence staples	₱ lb 5½@5¾c
Fence Staples, galvanized,	₱ lb 7@7¼c
Stubs Steel Wire	$7 00 to £
Barb Wire, painted	8¼c
Barb Wire, galvanized	9¼c
Crucible Steel Ropes from ¾ in. at 9c to 1¼ in. at	52c
Best Selected Iron Ropes from 3-16 in. at 8c. to 1¼ in. at	33c

Boiler Plates.

("Gaylord"--Standard Quality.)

C. No. 1	4 50
C. H. No. 1 Shell	4 75
C. H. No. 1, 50,000	5 25
C. H. No. 1, 55,000	5 75
C. H. No. 1 Flange	6 50
Firebox	
T. S., 60,000 (as per)	6 50
T. S., 65,000 (act of)	
Homo. Steel, 70,000 (of Cong)	7 50

Heads, ¼c ₱ lb extra.

N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ₱ lb less than above prices.

Sheet and Tank Rivets. "Norway."

All sizes dis. 15

Boiler Rivets—"Albany."

⅛, ¼, 11-16, and ½ in. diam. 5 50

Boiler Makers' Tools.

Doty's Power Shears	net list
" Hand Lever Shears	net list
" Power Punch	net list
" Hand Punch	net list
Steel Screw Punch	net list
Iron Screw Punch	net list
Boiler Plate Rolls	net list
Buffalo Forges & Blowers	dis 20
Watson's " "	net list
Spring Tube Expander	dis 15
Roller Tube Expander	net list
National Tube Cleaner	dis 20
Wire Flue Brushes	net list
Anvils—"Peter Wright"	12½ ₱ lb
Solid Box Vises	net list

Nuts, Bolts, etc.

Square & Hex. Nuts	7 off list
Washers	6 off list
Machine Bolts	dis 60
Bolt Ends	dis 60
Boiler Patch Bolts	net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch	dis 37½
"National" Standard Gauge 11 inch to 15 inch	dis 25
"National" Special Locomotive Tubes	net list

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch	2 85
4½ to 6 by ⅜ to 1 inch	3 00
1¾ to 6 by 1½ to 1½ inch	3 25
1¼ &1¾ by ⅜ to ¾	3 00
1 & 1¼ by ⅜ to ¾	3 10
⅝ ¾ and ⅞ by ⅜ to ½	3 25

Round.

1 to 1⅜ inch	2 85
2 to 2⅝	3 15
2¾ to 3¼	3 45
3⅜ to 4	3 50
4⅛ to 4½	3 45
4¾ to 5	4 90

Square.

1 to 1⅜ inch	2 85
2 to 2⅝	3 10
2¾ to 3¼	3 45
3⅜ to 4	4 00
⅞ to ⅞	3 00

Heavy Band.

1⅜ to 6 by ⅛ and 5-16 inch	3 10
1 to 1⅜ by ⅛ and 5-16 do	3 15
⅛ to ⅜ by ⅛ and 5-16 do	3 50
⅜ to ½ by ⅛ and 5-16 do	3 10

Half Oval and Half Round.

Wagon box iron ⅛ and ⅜ 4 80

1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1⅛ to 6 by ⅛ to 3-16	3 50

Hoops.

1¼ to 2 , Nos 16 to 18	3 90
1¼ to 4 do 13 to 15	3 60

1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24	5 60
No 25 to 26	5 85
No 27	6 10
No 28	6 60

English Steel.

Best cast	₱ lb 15½c
Extra cast	16½c
Round machinery, cast	14c
Swaged, cast	18c
Best double shear	15½c
Blister, 1st quality	13c
Refined tool steel	16½c
Spring calking	7¼@7¾c
German steel, best	11c
2d quality	10c
3d quality	9c
Sheet cast steel, 1st quality	15½c
2d quality	14½c
3d quality	12½c

American Steel.

Best brands of refined cast steel, ¾ to 2 inches	12c
Crucible cast	7c
Open-hearth ditto	4½c
Hammer cast steel	9c
Spring cast steel	7½c
Bessemer and open-hearth spring	5c
Ditto plow	4½c
Steel boiler plate	6½@7c
Bessemer machinery	5 @6c
Spring and calking	7¼@7½c
Tire	5
Sleigh shoe	5

Bessemer Steel Tire.

¾ to 1 by 3-32	4¾ ₱ lb
¾ to 1 by ⅜ to 5-32	4½ ₱ lb
¾ to 1 by 3-16 to ¼	4¾ ₱ lb

Miscellaneous Cast Steel.

Auger and auger bit	1
Axle steel for wagons	7
Frog points and plates	8
Frog size bars	8½
Pick, hammered	10
Mattock, beveled	9
Table cutlery	7½
Trap spring steel	10
Pike and cant hook	9
Coal and granite	8½

TINNER'S STOCK.

Tin.

Banca	per lb. 28@29c
Straits	" 24@25c
English	" 24@25c
Bar	" 27c

Tin Plate.

IC 12x12 charcoal	$ 6 50
IC 14x20 do	6 25@6 50
IX 14x20 do	8 25
DC 12½x17 do	6 00
DX 12½x17 do	8 00
DXX, 12½x17 do	10 00
DXXX, 12½x17 do.	12 00
IC, 20x28 do	14 50
IX, 20x28 do	15 50
IC, 14x20, Best Roof	6 00
IX, 14x20, do	8 00
IC, 20x28 do	13 00
IX, 20x28 do	14 50
IC, 10x14 Best Coke	5 75

Solder.

Half and Half, in bars	15½
No. 1 do	14½
Spelter Solder	25

Pat Planished Sheet Iron.

[A]	per lb 10½c
[B]	9½c

Nos	10	15	21	25
	to 14	20	24 & 26	
Com	3-60	3-80	4-00	4-20
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ½c extra

Zinc.

Sheet, cask	7½@ 7¾
Sheet, open	8@ 8½

Tinners' Tools & Machines

Machines (P. S. & W.)	list add 20
Tools (P. S. & W.)	add 6

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe	dis 60.
Enameled Pipe	dis 65
Artesian Well Casing	net list
Hydraulic Tubes	net list
Malleable Iron Fittings	net list
Cast Iron Fittings	dis. 35
Globe Valves	dis. 35
Angle Valves	dis. 35
Check Valves	dis. 45
Safety Valves	dis 35
Eddy Gate Valves	dis. 20
Steam Cocks	dis. 35
Service Cocks	dis. 35
Ball Gauge Cocks (net per dozen)	$15
Compression Gauge Cocks	dis. 35
Miss. Gauge Cocks	dis. 35
Register Gauge Cocks (net per dozen)	$15
Cylinder Cocks	dis. 30
Air Cocks (net per dozen)	$2 75
Oil Cups	dis 30
Steam Gauges	dis. 40
Water Gauges	dis. 40
Scotch Glass Tubes	dis. 50
Steam Whistles	dis. 35
Iron Body Globe Valves	dis. 35
Iron Body Safety Valves	dis 35
Iron Body Steam Cocks	dis 35
Pipe Tools	special
Globe, Angle and Check Valves (Star's regrinding)	dis 25
Mack's Injectors	dis 25

Babbitt Metal.

No. 1	₱ lb 16
" 2	" 14
" 3	" 10
" 4	" 8

LEAD.

American,	₱ lb 5½c
Bar,	₱ lb 5¾c dis 10 per ct
Pipe,	₱ lb 5¾c dis 10 per ct
Sheet	₱ lb 8c dis 10 per ct
Tin-lined pipe	₱ lb 15c dis 10 pr ct
Shot Drop 7c; Buck	7c
Chilled Shot	8c

COPPER.

Lake Ingot	18½@18¾c
Baltimore	17¾@17¾c
Arizona	17½c

Sheathing Braziers Copper, Bolts, &c.

Brazier's Copper, ordinary sizes, 16 oz. per sq. foot, and over per lb. 30c

Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb. 32c

Brazier's Copper, 10 oz and 12 oz. per sq. ft. per lb. 34c

Brazier's Copper lighter than 10 oz. per sq. ft. per lb. 36c

Circles less than 84 inches in diameter per lb. 33c

Circles 84 inches in diameter and over per lb. 30c

Segment and Pattern sheets per lb. 33c

Locomotive Fire Box sheets per lb. 30c

Sheathing Copper, over 12 oz. per sq. ft. per lb. 28c

Bolt Copper per lb. 30c

Copper Bottoms per lb. 31@32c

No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x18	per sheet 6c

All other size sheets, 2½c per square foot For tinning both sides, double the above amount.

SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES. Net Tons.

No. 1 wrought scrap	$24
Sheet and hoop "	10@11
Cast scrap, (No. 1 heavy)	19
Cast Scrap (Stove Plate)	12

OLD METALS.

Old copper per lb	15c
No. 1 H. Brass per lb	14
Heavy yellow Brass do	12
Light Brass per lb	12
Scrap Zinc per lb	6
Tea Lead per lb	4
Heavy Lead per lb	3

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas

Inside Diameter. Inches.	Plain, Price Per Foot.	Galvan or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	.24
¼	08	$0 11	.54	.42
⅜	09	12	.67	.56
½	11	15	.84	.85
¾	13½	19	1.05	1.13
1	19	28	1.31	1.67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2.69
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7.55
3½	1 25	1 70	4 00	9.05
4	1 50	2 05	4.50	10.73
4½	1 75	2 40	5.00	12.49
5	2 25	3 00	5.56	14.56
6	2 75	4 00	6.62	18.76
7	3 75		7.62	23.00
8	4 75		8.62	28.00
9	6 50		9.68	34.40
10	8 00		10.75	40.64
12	12 00			54.65

Discount, 62½ per cent; galvanized, 62½ per cent.

BRASS.

Cash prices for Roll and Sheet Brass For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos not thinner than No 28, wider than 2 in. not wider than 14 inch	30c
All Nos to No. 28, inclusive, and widths over 14 to 20 in. inclusive	35c
All Nos. to No 28, inclusive, and widths over 20 to 30 in. inclusive	38c
½c per lb. advance on each No above Nos. 28 to 38, inclusive.	
All Brass thinner than No. 8 is Platers' Brass at	38c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches	37c

Low Brass.

4c per lb. more than High Brass.

Gilding metal 8c per lb. more than High Brass

Platers' or Gold Metal In Bars	48c
Sawed	51c
Planed or Polished	54c

For Slitting.

Metal in width in. to ½ in. to No 28, inclusive, 1c per lb advance	
Metal, in width 2 in. to 1 in, thinner than No. 28, 2c per lb advance	
Metal, in width ½ in. to ¼ in. thinner than No. 28, 5c per lb. advance	
Metal ¼ in in width and less, 10c per lb. advance	
Any of the above widths cut to particular lengths, add 7c per pound.	

COAL,

WHOLESALE.

Wholesale f.o.b vessel at Cleveland:

Carbon Hill and Monday Creek	$2 65
Massillon	2 75@ 2 85
Brier Hill	3 25@3 75
Pittsburgh	3 00
Salineville	2 25
Tuscarawas	2 25

RETAIL.—Delivered.

Massillon Lump	$4 00
" Nut	3 75
Carbon Hill and Monday Creek, lump	3 75
Carbon Hill and Monday Creek, nut	3 50

75c less on cars by car load.

Anthracite Stove and Chestnut	7 15
Egg and grate	6 00

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15	
11x14 to 15x24	8 50
16x24 to 20x28	9 75
15x34 to 24x30	10 75
26x28 to 24x36	11 50
26x36 to 26x44	13
26x46 to 30x50	14 00

DOUBLE THICKNESS

6x8 to 10x15	11 7
11x14 to 15x24	13 25
16x24 to 20x28	15 75
15x34 to 24x30	17 25
26x28 to 24x36	18 50
26x36 to 26x44	21 25
30x50	22 50
30x52 to 30x54	23 25
30x56 to 34x56	25 00
34x58 to 34x60	27 75
36x60 to 40x60	30 00

Dis 60 & 15 single, 60 & 20 double

OILS.

Pure Oils. packages included

Sperm, winter bleached per gal	1 25
Whale, winter bleached per gal	63
Straits	50@53
"A" oil for tanner's use	35 @40
Lard oil extra W S	1 05@1 10
do No 1 do	82@87
do No 2 do	72@77
Tallow oil	75
Neatsfoot oil pure	90@95
do No 1	80@85
Linseed oil, raw	55
do do boiled	58
Cotton seed oil white	64 @ 66
do do yellow	60 @ 63
West Virginia lubricating 28 deg	13c@15c
Pure Mecca	55@ 60
Paraffine oil winter pressed	25@ 30
Machinery	40
Engine	50
Miners' oil	40@45
Drilling oil	40

Hides and Leather.

Prime cured hides	7½
Green hides	6@6½
Bull, scrubby, badly scored or damaged, cured, two-thirds price.	
Prime dry hides	13@14
Horse hides, green	$1 75@2 00
Horse hides, dry	$2 00@2 25
Prime cured veal calf,	12½
Prime Deacon S, salted	65@70
Pelts, wool on	32@34
Fresh slaughter sheep	30@$1 50
Fresh slaughter lambs	50@60
Green calf skins	13
Hemlock rough	23@24
Oak harness	34@38
Oak sole	37@40
Union harness	31@34

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W, E, Analytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers.

SMITH & TEACHOUT — (Established 1857.) Boiler, Tanks, Stills etc. 439 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND BOILER WORKS mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St. and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig Iron. Rooms 1 and 2.

Carriage Blacksmith.

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .93 Woodland ave.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furnture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 177 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

SLATER, G. A., Carriage dealer, sells the best work for the lowest price. A fine assortment always on hand. Repository 365 Euclid Avenue.

Coal and Pig Iron.

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 122 Water Street.

Electrical,

ELECTRIC SUPPLY CO. manfrs and dealers in Electric Burglar Alarms, Annunciators, Cell Bells and Batteries. Telephone lines built and repaired. 145 Seneca Street.

Fresco Artists.

KEMMER & KUSHMAN DECORATIVE CO., Fresco Artists, Fine Modern Wall Papers. 238 Euclid ave.

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

VIADUCT FOUNDRY COM'Y, Aems, Carlin & Strangward manfrs of Machinery Castings Fine Light Castings a Specialty. Office & Works 11 13 15 and 17 Detroit Strert. near Center.

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 485 Broadway.

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws, 11 So. Water

Flue Cleaner.

CLEVELAND FLUE CLEANER M'F'G. CO. manufacturer of Aitchison & Doolittle's Patent Steam Flue Cleaner, 22 & 24 Power Block.

Hotels.

FOREST CITY HOUSE, cor. Public Square and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL, Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street.

Hardwood Lumber.

MARTIN, J. T. dealer in Hardwood Lumber, Stone's Levee, near Central Way.

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed umber, timber, lath, shingles, etc. 47 Central Way

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

Cleveland Business Directory.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manuf'rs. of Steel and Iron Wire and Steel Tire.

WORTHINGTON, GEO & CO., Hardware and Dealers in Metals. Water street.

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

Machinery and Boilers.

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

Machinery Depot.

CLEVELAND MACHINERY DEPOT, (now National Machinery Depot.) The largest stock of New and Second-hand Engines, Boilers and Machinists' Tools. Shop and Warehouse corner Bond and Superior streets.

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO., manufacturers of lubricating oils, 23 Euclid ave.

Paints and Oils.

MASTERS, J. N. jobber in Paints, Oils, Varnisher. Brushes, 34 Prospect st.

Pattern and Model Makers.

WHITTINGHAM, J. & C., Metal Pattern and Model makers 52 Canal Street.

REID, J. C., Pattern and Model Maker. 52 Canal Street., (Up Stairs.)

COTTRELL & CO., W. L., Pattern Makers, 53 Center street.

STAIR BUILDER.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio.

JOHNSON & PURSER, Stair Builders, and manuf'rs of Mantels, Odd Pieces of Furniture, &c. 30 West street, up stairs.

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

Tanners.

GAENSSLEN BROS., Tanners, and dealers in leather, oil and shoe findings. 80 Water-st.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample Trunks and Cases a Specialty. 56 Public Square.

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents. 17 & 18 Board of Trade Building. 122 Water Street.

Wood Carving.

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

Business Directory.

Akron, O.

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill and Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Ag'nt

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

AKRON POLISHING & PLATING WORKS.

Alliance, O.

ARLINGTON HOUSE, cor. Main and Liberty Streets. Centrally located. Sample Room for Commercial Travellers. H. S. Adams, proprietor

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing.

Cuyahoga Falls, O.

THOMAS BROTHERS, manfrs of Ohio Stone Ware. Cuyahoga Falls Stone Ware Factory, cor. Main and Broad streets,

TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

SNYDER, H. wholesale manu acturer of Sash, Doors, Blinds, &c. Send for Price Lists.

THE CUYAHOGA FORGE AND IRON CO., manfrs. of every description Car, Truck and Driving Axles, Forging, Shafting, &c.

Canal Dover, O.

HEIKMAN, E., manufr. and dealer in harness leather, upper, kipp and calf. Also, manufacturer & dealer in prime English Dairy cheese. Highest market cash price paid for hides.

Business Directory.

Columbus, O.

PAT. ADJUSTABLE WINDOW CURTAIN Cornice, manufactured by Strader's Curtain Cornice Works.

ROYCE & PULLING manufrs of Patent Steam Pumps for all purposes. Store room 30 High street. Works Nos. 5 and 7 Scioto street.

U. S. CARRIAGE CO. builders of fine Carriages, Buggies and Phætons. Salesrooms and Office 257, 259 and 261 Fourth street.

REYNOLDS BROS., manufacturers of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co.

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

Canton, O.

DIEBOLD SAFE & LOCK CO., manuf'rs. Safes, Locks, Bank and Safe Deposit Works.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc

NEW AMERICAN HOUSE, Canton. Fred. Hipp, Prop.

EBERSOLE & KAILEY, Machine and Jobbing Shops. Gearing for Patterns or Machinery a specialty. Models of all kinds made & repaired.

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Massillon, O.

CITY CARRIAGE WORKS, P. H. Young, prop. manfact'r of Carriages, Phætons and Spring Wagons. Work warranted. Cor. Tremont & Erie.

Painesville, O.

NORTH AMERICAN CUTLERY CO., m'fr's of Steel Shears and Scissors—best quality.

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect sts.

BALDWIN, D. L. & SON, Contractors & Builders and manfrs of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

Steubenville, O.

DORRANCE, D.W., Tool Works, manufacturer of hand-made miners' and stone-cutters' Tools Promp attention given to mail orders.

Sandusky, O.

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacobs' Patent Neck Yokes.

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO. builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry

RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Cor. Water and Lagrange streets.

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description. All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss Springs, &c. made to order. 92 St. Clair Street.

UNION Wooden Ware Manufacturing Co. manufacture Sewing machines, washboards, children's wagons, carts, wheelbarrows, sleds, kitchen wooden ware, &c.

HEPBURN BROTHERS, proprie. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street foot of Cherry.

Youngstown, O.

BELL, EDWIN & SON, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock.

DINGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath.

MORTON HOUSE, formerly Maitland House, James Morton, Prop.

TOD HOUSE, cor. Diamond and Market streets. Henkel & Bowman, Props.

Zanesville, O.

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

Rochester, Pa,

OLIVE STOVE WORKS, (limited) manufacturers of Stoves and Hollow Ware.

Erie, Pa.

ERIE STEAM BENDING WORKS. H. G. Fink, prop'r, manufacturer of Bent Felloes, poles, snaths, bob runners, etc. Cor. 12th & Cherry.

GUNNISON, A. B., wholesale manufacturer of Wood Pumps. 233 East Twenty-Second St.

BALL ENGINE CO., limited, manufacturers of Automatic Engines of 15 to 30 horse power

NOBLE SEWING MACHINE CO. manfrs of the New Noble Sewing Machine. Send for circulars and prices.

A. B. FELGEMAKER & CO. Church Organ builders. Descriptive catalogue furnished on application.

Business Directory.

Titusville, Pa.

FOSTER & McKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, nr. Railroad.

Meadville, Pa.

CURRY & CO. general jobbers in Castings of all kinds.

Oil City, Pa.

REID, JOS. Machinist, steam engine and pump repairing. Brass and iron castings, light and heavy, made on short notice.

Sandy Lake, Pa.

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List.

Pittsburgh, Pa.

PRINTING PRESSES. W. A. Bunting, manufacturers' agent. Printers supplies, type, cards. 42½ Sixth Street. [Up stairs.]

BAIR & GAZZAM, practical machinists; gear cutting a specialty. Rice's Feed Water and Heater. 17 Wood street, corner First Avenue.

Wheeling, W. Va.

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pulleys, Shafting, &c. Cor. 18th & Chapline streets.

Louisville, Ky.

HAIGHT, ROBERT. Gold, Silver and Nickel Plating and Brass Finishing Shop. Car Trimmings and Steamboat work a specialty. 1 West Market street

Union City, Ind.

LAMBERT, J. W. & CO., mfrs of fork, rake, hoe and broom handles; spokes, hubs, whiffletrees, yokes, plow-rounds, &c. Correspondence solicited.

Olean, N. Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc.

Rochester, N. Y.

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mall, chisels, &c.

ELEVATORS for Hotels, Factories and Private Houses. J. S. GRAHAM & CO.

KELLY, PETER, Boiler Maker, Mill street, cor. Furnace. Sheet iron work made to order.

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. GRAHAM & CO.

KINGSBURY, G. J., Cracker and Oven Machinery Works. Shawmut Building, Mill St.

WISEMAN, Albine, manufacturer of all kinds of Shoemakers' Tools. 117 North Water St.

ULSCHT & LINN mfrs of Wood Lathes, Engraving Machinery, &c 131 N. Water street

RAZOR STROPS. Sole mfrs. of all kinds of Razor Strops. Ulscht, Linn & Co. 131 N. Water

Buffalo, N. Y.

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling machines, foot and power lathes. 70 Columbia street.

EMPIRE STATE MF'G CO., O. F. Swift, prop'r, manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio

WHITE, L. & I, J. manfrs of Coopers' Tools, Carpenters Tools, Draw Shaves, Cleavers Choppers, Ship Tools, &c. 312 Exchange street.

THE BUFFALO NUT AND BOLT CO. [Limited.] Manufrs. of Hot Pressed Nuts, Bolts, Washers, Rivets, &c. No. 226 Ohio Street.

Rheims, N. Y.

GREAT WESTERN CHAMPAGNE. Finest made in America. Equal to best imported. Has taken highest awards everywhere, and is used all over the Continent. Try a case, and you will have no other. Pleasant Valley Wine Co., Rheims, N. Y.

Brattleboro', Vt,

A JOY FOREVER!

ESTEY ORGANS

Manufactured by

J. ESTEY & CO.,

Brattleboro', Vt.

(Catalogue free on application.)

H. C. CHANDLER
Engraver on Wood
Cor. Circle & Market Sts.
JOURNAL BUILDING INDIANAPOLIS, IND.

CLEVELAND
ELECTROTYPE
FOUNDRY
55 FRANKFORT STREET 55
CLEVELAND, O.

LUMBER.

PLANK, MIXED WIDTHS
2 inch, 12, 14 and 16 feet, together.

A 1 and 2 uppers	$50
A 3	40
B	32
C	22
D	15
E	13

1¼ and 1½ inch.

A 1 and 2 uppers	$48
A 3	40
B select	32
C	21
D	15
E	13

BOARDS.
One Inch, mixed widths.

A 1 and 2 uppers	$44
A 3	36
B select	30
C	19
D	16
E	13

STOCK BOARDS.
12 Inches wide.

A 1 and 2 uppers	$45
A 3	38
B	32
C	21
D	16

STRIPS.
6 Inches wide.

A 1, 2, and 3	$42
B	32
C	22
D	16
E	14
Norway Fencing Strips	17
Norway Flooring Strips	25

WORKED LUMBER
FLOORING.

Flooring—A 3	$42
B	38
C	24
D	20
Norway Flooring—A 3	28
C	22
D	18
Matched Drop Siding, 6 inches—A 3	42
B	38
C	24
D	20

Beaded Ceiling $2 higher than Flooring.
One half inch Bevel Siding—A 1 and 2 24
A 3 20
B 18
Ash Flooring—A 1 and 2 40

BILL STUFF.

Small, joists, 12, 14 and 16 feet	$15
Timber, larger than 8x8 special.	
Timber, longer than 18 feet, adds about $1 per foot per M. extra.	
Cedar Posts, large	30 00
" " medium	25 00
" " small	$15 to 20 00

SHINGLES, LATH AND MILL WORK

Shingles XXX	$4 50
Clear Butts	3 25
Lath	3 00

Surfacing, one side, adds $1.25; two sides $1 50
Matching, flooring and drop sidings, $2.50.

LAKE FREIGHTS.

COAL.

Buffalo to Chicago	$.62½@.65
Toledo to Chicago	1.00
Cleveland to Chicago	70@75
Erie to Chicago	70@75
Oswego to Chicago	1.50
Fairhaven to Chicago	1.30
Buffalo to Millwaukee	70@75
Cleveland to "	70@75
Erie to Milwaukee	75
Buffalo to Racine	80
Buffalo to Kenosha	85

IRON ORE.

Marquette to Lake Erie ports	1.25
Escanaba to Lake Erie ports	90@95
Escanaba to Chicago	90@95
Marquette to Chicago	1.15@1.20

LAKEWOOD, N. Y.

This favorite resort is now entering upon its ninth season, and continues to hold its place in the front rank of summer resorts.

To those who seek rest without stagnation, pleasure without excitement, the delights of rural life without its inconveniences, and the charm of dwelling beside a large body of water, Lakewood recommends itself strongly to favor. A more beautiful spot would be hard to find. With its picturesque cottages surrounded by trees; its velvet lawns sloping down to the lake; the church with its spire; the great hotels with their cool and shady verandahs; and the lake in the foreground, it presents a perfect picture of rural loveliness.

LAKEWOOD, originally called "Lake View," from the extensive view of the Lake and vicinity, is directly on the line of the

New York, Penn. and Ohio Railroad,

(Formerly A. & G. W. R. R.)

On the southern border of Lake Chautauqua, and is not reached by any other railway.

The through New York, Niagara Falls, Boston and Saratoga Express trains pass directly through this beautiful and popular resort, and all trains stop regularly at Lakewood Depot to deliver and take on passengers. Conductors are instructed to give stop-over checks on all through tickets, whether reading good for stop-over or not. This should be understood as giving passengers the right to reach Lakewood in through cars, and when they are ready to resume their journey they can step right into one of

PULLMAN'S PALACE
Drawing Room or Sleeping Coaches,
and go through to
Niagara Falls, Saratoga, New York or Boston.

This cannot be done by any other route, as no other road runs through cars or Palace Sleeping Coaches to or through any place on Lake Chautauqua.

The most complete arrangements have been made for the transportation of passengers to the Sunday School Assembly. Round trip tickets direct to Fair Point (Chautauqua) are on sale in all the principal cities via the **New York, Pennsylvania and Ohio Railroad**, and baggage will be checked to the Assembly Grounds.

For Descriptive Pamphlets, Tickets to Lakewood and return, and to Niagara Falls and return, good for stop-over at Lakewood, apply at Offices of the **New York, Pennsylvania & Ohio Railroad**, (A. & G. W. R. R.) Also at Offices of connecting lines West and South.

TICKETS are now on sale, good for return until September 30th.

A. E. CLARK, Gen'l Pass'r Ag't, Cleveland, O.
J. M. FERRIS, Acting Gen'l Manager, Cleveland, O.

Blue Grass Route of Ohio

TIME TABLE.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

Schedule No. 5--Dating from Sunday, June 4.

SOUTH-BOUND TRAINS.

STATIONS.	Accom	Accom	Expr	Mail	Sundays only
Leave.	P. M.	P. M.	P. M.	A.M.	P.M.
Cleveland	5.30	3.45	2.30	8.50	....
Hudson	6 53	5.02	3.35	10.10	4 20
Cuyahoga Falls	7 11	5.30	3.58	10.29	4 40
Akron	7 23	5.46	4.10	10.42	5 00
*North Portage	P M	6 00	4 24	10.54*	6 14
Clinton	....	6 19	4.44	11 09	5 31
Warwick	....	6 29	4.49	11 14	5 37
*Marshallville	....	6 43	5.02	11.27*	5 50
Orrville	....	6 58	5.14	11.42	6 02
*Apple Creek	....	7.17	5 32	11 58*	6 22
Fredricksburg	....	7.32	5.45	12 11	6 37
*Holmesville	....	7.48	5 55	12.21*	6 48
Millersburg	Accom	7.55	6.08	12.34	7 00
	A. M.	P.M.			A.M.
Millersburg	5.50	....	6.08	12 34	7 00
*Killbuck	6 02	....	6.20	12.47*	7 19
*Black Creek	6.18	....	6 31	12.59*	7 25
Gann	6 33 B 6 53 S	....	6.51 7.11 S	1.19	7 47
Danville	7 01	....	7.20	1.29	7 59
Howard	7.13	....	7.29	1.38	8 10
Gambier	7.22	....	7.38	1.47	8 20
Mt. Vernon	7.35	....	7.51	2.00	8 33
*Bangs	7 45	....	8 01	2.1 *	8 45
*Mt. Liberty	7 53	....	8 09	2.20*	8 54
Centerburg	8.05	....	8.18	2.30	9 05
*Condit	8.19	....	8 32	2 44*	9 19
*Sunbury	8.27	....	8.40	2.58*	9 28
*Galena	8.32	....	8 45	2.58*	9 34
Westerville	8.48	....	9 00	3 15	9 50
Arrive at Columbus	9.15	....	9.25	3 40	10 20
	A.M		P M	P.M.	A.M.

NORTH-BOUND TRAINS.

STATIONS.	Expr	Mail	Accom	Accom	Sundays only
Arrive at	P M	P M	A. M.	A. M.	A.M.
Cleveland	1 45	6 55	10.15	8.10	....
Hudson	12.35	5.48	8.53	7.15	10.30
Cuyahoga Falls	12.16	5 30	8.33	6 58	10.11
Akron	12 03	5.17	8.20	6.45	9.50
*North Portage	11.46	5.00*	8.03	A. M.	9.34
Clinton	11.30	4 44	7.46	....	9.18
Warwick	11 25	4 37	7.37	....	9 12
*Marshallville	11.10	4.27*	7.23	....	9.00
Orrville	10.57	4.14	7.10 6.40 D	....	8.47
*Apple Creek	10.40	3.56*	6.22	....	8.27
Fredricksburg	10.26	3.43	6.08	....	8 13
*Holmesville	10 16	3.33*	5.58	....	8.02
Millersburg	10 05	3.22	5.45	Accom	7.50
			A. M.	P. M.	P.M.
Millersburg	10 05	3.22	....	8 35	7.25
*Killbuck	9 51	3.08*	....	8.23	7.13
*Black Creek	9 39	2.57*	....	8.11	7.00
Gann	9.17	2.36	....	7.49	6 38
Danville	9.07	2.27	....	7.39	6.25
Howard	8.58	2.18	....	7 29	6.14
Gambier	8.49	2.09	....	7.14	6 03
Mt. Vernon	8.37	1.57	....	7 02	5.54
*Bangs	8.22	1.40*	....	6.46**	5.37
*Mt. Liberty	8.14	1.31*	....	6.37	5.28
Centerburg	8.05	1.22	....	6.28	5.17
*Condit	7.51	1.09*	....	6.14	5.03
*Sunbury	7.42	1.01*	....	6.06	4.53
*Galena	7.37	12 56*	....	6.00	4 47
Westerville	7.20	12 40	....	5.43	4 30
Leave Columbus	6.55	12.15	....	5.15	4.00
	A. M.	P M		P. M.	P.M.

* Stop on signal. B Breakfast. S Supper.

Special Round trip rates will be made for Sunday trains.

N. MONSARRAT, Gen'l Supt. Akron, O.
E. T. AFFLECK, General Passenger Ag't, Columbus, O.

TAKE THE

BEE LINE ROUTE

POPULAR THOROUGHFARE
BETWEEN THE
EAST AND WEST.

No Midnight Changes!
No Emigrant Trains!
Connections in Union Depots for all Points.

☞ The unequalled facilities offered by this Company for luxurious travel are

Elegant, easy riding, Day Coaches,
Elegant Wagner and Woodruff Drawing Room and Sleeping Cars.
Elegant Horton Reclining Chair Cars, between Lake Erie (Cleveland,) **and the Mississippi River,** (St. Louis) **FREE.**

Model Hotel cars attached to Express Trains, which together with a track and road bed of known excellence, you are assured Comfort and Safety with

FAST TIME!

☞ Bear in mind that our through car routes are numerous and excellent, a great convenience to all travelers.

Consult your best interests by asking for and securing a Ticket via the Bee Line. For Maps, Time Tables, and other information, call on

E. B. Thomas, Gen'l Manager.
O. B. Skinner, Traffic Manager.
A. J. SMITH, Gen'l Pass. Ag't.

TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

Trains marked with a * are the only trains that arrive and depart in this city on Sundays.

ARRIVALS.	a.m.	a.m.	p m.	p.m.
Through from East	*2 50	*6 35	1 25	*1 40
Through from East	....	....	....	*7 05
N. Y. & Chicago Ex	....	12 23	....	....
Conneaut Accommoda'n	8 40	....	....	....
Nottingham Accom'd'n	10 05	....	4 45	....
Elyria Accommodation	8 50	....	....	....
From West via Sandusky	*7 05	11 00	....	10 12
Fast Express	*1 35	....	....	....
From West via Norwalk	....	11 00	2 25	10 10
Pt. Clinton Accom'dat'n	....	11 00	....	....

DEPARTURES.	a.m.	a.m.	p.m.	p.m.
Through Eastern Train	*7 30	11 15	*2 55	10 35
Fast N. Y. Express	*1 50	....	....	....
Conneaut Accommod'n	....	....	4 50	....
Nottingham Accom'd'n	19 00	....	12 15	....
Elyria Accommodation	....	....	5 00	....
West via Norwalk	6 40	....	3 30	*7 35
West via Sandusky	3 05	7 00	*2 05	5 00
N. Y. & Chicago Ex	....	12 23	....	....
Pt. Clinton Accom'dat'n	....	....	5 00	....

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'polis Ex	*7 10 A.M
No. 8 C. T.V. & W. & Clev Accom	10 30
No. 12 St. Louis & New York Exp	*3 00 P.M
No. 4 Special Cin & New York Exp	*3 40
No. 10 Wheeling & Cleveland Exp	7 15
No 6 Indianapolis & Columbus Exp	10 20

DEPARTURES.

No. 1 Cincinnati & Columbus Exp	8 00 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex	7 10
No. 3 St. Louis & Cincinnati Ex	‡2 00 P.M
No. 5 Night Express	*7 25
No. 7 C.T.V. & W. & Col. Accom	4 00

‡This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

No. 4 Wheeling & Cleve'd Exp	7 15 P.M
No. 2 Uhrichsville Accom	10 30 A.M

DEPARTURES.

No. 1 Wheeling & Cleve'd Exp	7 10 A.M
No. 3 Uhrichsville Accom	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 7 Mahoning Valley Accommo	10 55 A.M
No. 3 New York Express,	*7 00 P.M
No. 1 New York Express,	6 50 A.M
No. 3 Pittsburgh Express,	*7 00 P.M
No 5 Pittsburgh Express,	2 00
New York Express	2 00
No 9 Youngstown and Pitts. Local	10 15

DEPARTURES.

No. 12 New York Express,	*7 10 A.M
No 4 Youngstown Local,	11 00
No. 8 Mahoning Accommodation,	4 25 P.M
No. 2 New York Express,	10 45
No. 12 Pittsburgh Express,	*7 10 A.M
No. 6 Pittsburgh & Main Line Express	2 30 P.M

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Mail	1 45 P.M	8 50 A.M
Express	6 55	2 30 P.M
Alliance Accommodation	10 15 A.M	3 45
Ravenna Accommodation	8 35	5 35
Night Express	6 30 A.M	†11 40 P.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

ARRIVE.	DEPARTURES.
No. 2 Accom... 10 15 A.M	No. 1 Mail ... 8 15 A.M
No. 6 Express ... 1 35 P.M	No. 3 Accom. 2 20 P.M
No. 4 Mail ... 6 30 P.M	No. 5 Exp ... 6 05

Special trains leave on Sunday at 8.30 A. M. and 4.20 P. M., arriving at Cleveland at 10 A. M. and 6.25 P. M.

Trains leave from Depot foot of South Water Street.

Connotton Valley Railway.

Arrive.	Depart.
No. 1 ... 10 05 A.M	No. 4 ... 4 05 P.M
No. 3. ... 7 15 P.M	No. 2 ... 0 15 A.M

All trains arrive and leave depot corner Commercial and Fifth Streets

Cleveland, Akron & Columbus Railroad,

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	1 15 P.M	8 00 A.M
Express	7 25	1 50 P.M
Accommodation	10 10 A.M	3 45 P.M

CLEVELAND & PITTSBURGH

RAILROAD.

Trains leave Cleveland and arrive at the points named below as follows: Night Express runs daily, all other trains daily except Sundays

	Mail.	Fast Line.	Accom.	Night Expr'ss.
Leave Cleveland	8 50 am	2 30 pm	3 45 pm	11 40 pm
Arrive Hudson	10 00	3 28	4 50	12 50 am
Ravenna	10 40	3 53	5 50	1 18
Alliance	11 25	4 25	6 05 pm	2 05
N. Philadel	11 35 pm	7 15	....	10 55
Salem	12 25	....	....	3 02
Canton	12 28	5 47	....	3 20
Massillon via Alliance	12 50	6 06	....	3 38
Akron	10 42 am	4 10	5 40 pm	....
Pittsburgh	3 30 pm	7 45	....	6 55
Wheeling	5 10	8 00	....	8 55
Marietta	8 45	....	....	....
Harrisburg	....	4 15 am	....	4 00 pm
Philadelphia	....	7 50	....	7 35
New York	....	11 15	....	10 35
Baltimore	....	7 55	....	7 20
Washington	....	9 17	....	8 47
Boston	....	8 00 pm	....	....

Ravenna Accommodation leaves Cleveland at 5:30 p m, reaching Ravenna at 7:15 p m; Akron 7:23 p m.

Newburgh Accommodations leave Cleveland at 11:00 a m and 12:30 pm. Returning, leave Newburgh at 11:10 am and 1:30 pm.

Passengers for New York, Philadelphia, Baltimore, Washington, and all points east of Pittsburgh make but one change of cars, viz. at Union Depot, Pittsburgh, excepting those leaving on the Fast Line which has Pullman Sleepers from Cleveland to Philadelphia and New York.

The Fast Line leaving at 2:30 P M. has elegant Pullman Palace Sleeping Cars through from Cleveland to New York without change. Pittsburgh Passengers who desire Parlor Car accommodations can secure seats in this car.

The Night Express has Pullman Sleeping Cars from Cleveland to Pittsburgh which can be occupied by passengers at Union Depot, Cleveland, any time after 9:00 P M. At Pittsburgh passengers can take elegant through Parlor or Sleeping Cars for the East.

Sleeping and Parlor Car accommodations from Cleveland and Pittsburgh eastward can be secured at the Union Sleeping and Parlor Car Office Union Passenger Depot; of H. C. Marshal, Union Ticket Office, Weddell House; or of the Ticket Agent at the Euclid Avenue Station.

Through tickets can also be secured at the same points. Baggage checked through from the Union Depot or from Euclid Avenue Station.

By the 8:50 A. M. train a through car leaves daily for Akron, Gambier, Mt. Vernon, Columbus and immediate points, without change.

The 2:30 P. M. train has through car for Akron, Orrville, Columbus and immediate points, arriving in Columbus at 9:25 P. M.

By the 3:45 P. M. Accommodation train cars run through without change from Cleveland to Cuyahoga Falls, Akron and Millersburgh.

Night Express leaving Cleveland at 11:40 P. M., runs daily, and makes connection at Wellsville for Steubenville, Bridgeport, Wheeling, Bellaire and intermediate points. Every night in the week except Saturday the night express runs via Wellsville. On Saturday nights it runs via Alliance. All other trains run daily except Sunday.

Trains arrive at Cleveland.—Night Express at 6:30 P. M., having Pullman Sleeper from Pittsburgh; Ravenna Accommodation, 8:35 A. M., Alliance Accommodation, 10:15 A. M.; New York Wheeling & Washington Mail, with Pullman Sleeping Car from New York and Philadelphia, 7:45 P. M.; New York, Philadelphia & Wheeling Express, 6:55 P. M.

WM. A. BALDWIN, General Manager.
E. A. FORD, Gen'l Pass. & Tkt. Agt. Pittsburgh, Pa.

C. L. KIMBALL, District Passenger Agent, corner Bank and St. Clair streets, Cleveland.

Cleveland to New York,

VIA THE

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

Formerly Atlantic & Great Western Railroad.

For New York, Boston and the East. The shortest and quickest route to Pittsburgh, Washington, Baltimore and the Southeast

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7:10A.M. LIGHTNING EXPRESS, (daily,) sleeping and hotel coaches from Leavittsburg 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:30 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p.m.; Buffalo, 6:15 p.m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p.m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 3:45 p.m.; arriving at New York, 6:50 a.m.

10:45 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m.; Meadville, 3:50 a.m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:20 a.m.; Corning, 12:53 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS,—daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:15 a.m.; via Sharon and Sharpsville to Meadville 7:40 p.m.; Corry, 9:10 p.m.; Lakewood, 9:50 p.m.; Jamestown, 10:00 p.m.; Salamanca, 11:10 p.m.

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:10 A.M. PITTSBURGH EXPRESS,—(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:18 p.m. and 4:20 p.m.

11:00 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 10:55 a.m. 2:00, p.m. 7:30 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

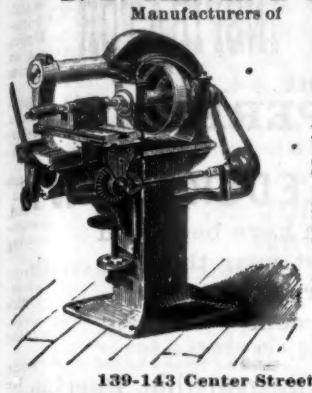
Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the Union Ticket Office, corner Bank and Superior streets; at office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK, Gen. Pass'r. Agt., Cleveland, Ohio.
M. L. FOUTS, Pass. Agt., 131 Bank st., Cleveland.
P. D. COOPER, Gen. Man'gr, Cleveland.

NOTICE.—Hereafter all Passes must be returned to the General Passenger Agent within FIVE DAYS after date of expiration; otherwise they will be discontinued.

E. E. GARVIN & CO.
Manufacturers of



No. 4 Milling Machine.

Milling Machines, Drill Presses
Hand Lathes, Tapping Machines, Cutter Grinders and Wood Planers. Milling Cutters, all shapes and sizes. Gear Cutting and Milling in all its branches.

139-143 Center Street,
Cornell's Building, NEW YORK.
Send for Illustrated Catalogue.

Smith & Curtiss,
JOBBERS OF
TEAS,
COFFEES AND SPICES
ALSO PROPRIETORS OF THE
CLEVELAND
Coffee and Spice Mills.
107 & 109 Bank Street,
Cleveland, O.

W. R. EYNON & SONS,
Cleveland, O.,
Manufacturers of
Machinist Tools, Milling Machines, Die Sinkers, Universal Heads,
Index Centers, Universal Vices, Centering Machines,
Grinding Attachment for Lathes.
GEAR CUTTING.
OFFICE & WORKS, WM. EYNON & SONS,
No. 73 SCRANTON AVENUE.

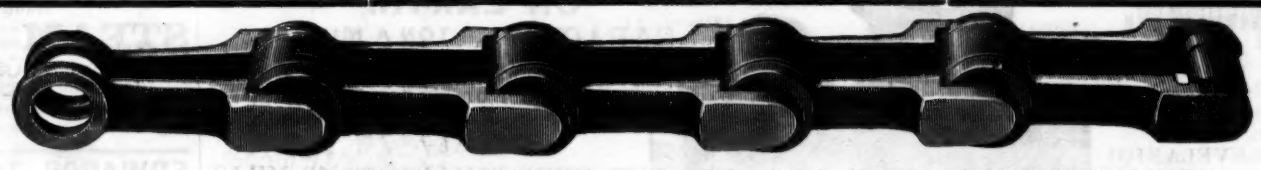
Dayton Malleable Iron Co.,
Manufacturers of
Air Furnace Iron.
A full line of Carriage and Plow Hardware kept in stock.
Catalogues for the Trade.

Practical Lithographer.
CHAS. F. SCHMIDT,
PRACTICAL
Lithographer, Engraver
AND PRINTER.
Room 12 Bratenahl's Block, cor. Superior and Sout Water Streets, Cleveland, O.
Correspondence solicited from Manufacturers.

Cleveland to New York
In Pullman Cars, via
Cleveland & Pittsburgh and Pennsylvania
RAILROAD.
ON and after Sunday, June 4, 1882, trains leave Cleveland and arrive at the points named below as follows: (Night Express runs daily, all other trains daily except Sundays.)

FRONT RANK
Double Top Vapor Stove
Patented Dec. 13, '81

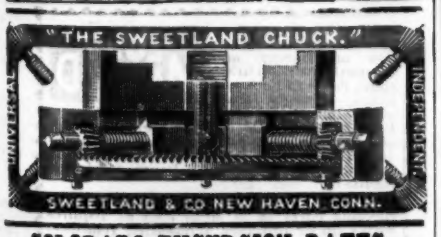
This Stove is acknowledged to be superior to all other Vapor Stoves.
AGENTS WANTED. Send for Illustrated Circular and Price List. Address
AMERICAN VAPOR STOVE CO.,
6 Champlain Street, next to Valley RR. Depot,
CLEVELAND, O.



THE LECHNER ANTI-FRICTION ROLLER AND DETACHABLE CHAIN.

CHAIN BELTING FOR TRANSMITTING POWER. The only medium made that will transmit so nearly ALL the power applied. No slipping nor lost motion. Especially adapted for driving HEAVY SHAFTING, ROLLER TRAINS in ROLLER and RAIL MILLS, TRACTION ENGINES, AGRICULTURAL MACHINERY, ELEVATORS, DRAGS, HOISTS, DREDGING MACHINES, LIFTING CRANES, ELEVATING NUT, SLACK and PEA COAL, SAWDUST and TAN BARK CARRIERS, &c., &c., &c., manufactured and sold by the **LECHNER MANUFACTURING CO., Columbus, O.** Also manufacturers of the LECHNER COAL MINING MACHINES, and power ROTARY COAL DRILLS. For further information send for Circulars.

JUDSON'S PATENTED
SECTIONAL
Assay Furnaces
AND APPLIANCES.
Model Furnace for 1881,
All steel, light and durable, with Revolving Grate, etc. Also
Judson's Practical Stoking Attachment
Guaranteed to feed coal, coke or charcoal without choking the draft.
Manufactured only by the patentee,
W. E. JUDSON,
Cleveland, O.



COLORADO EXCURSION RATES.

The Pennsylvania Company and Pittsburgh, Cincinnati & St. Louis Railway Company will, on July 15th, make a sweeping reduction in Excursion Rates from all Stations on their lines to Denver and return. Sale of tickets will continue till September 25th, 1882. The National Mining Exposition, which will represent all the resources, industries and attractions of the Rocky Mountain region, will open at Denver, August 1st. Drop a postal to E. A. Ford, General Passenger Agent, and ask him to send you pamphlet giving routes and Rates of Fare, they are furnished free of charge.

JOSEPH M. DOWNING.
UNION TUBE WORKS, NEWCASTLE, PA.
MANUFACTURER OF
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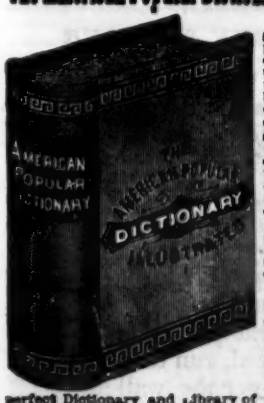

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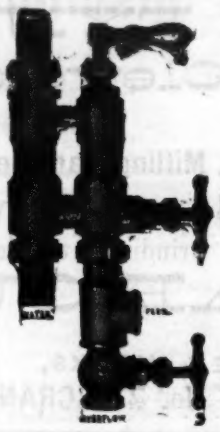

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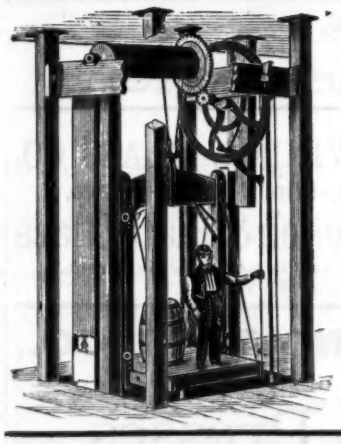

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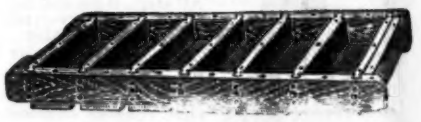

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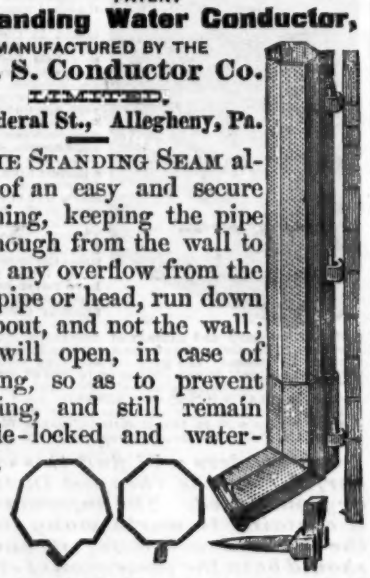

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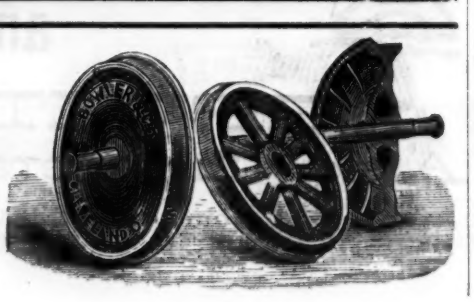

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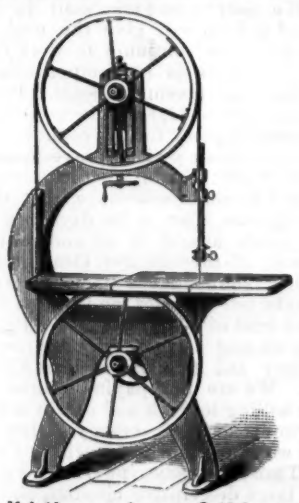

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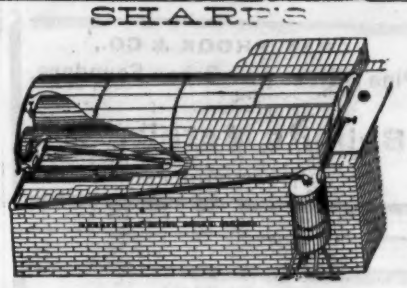

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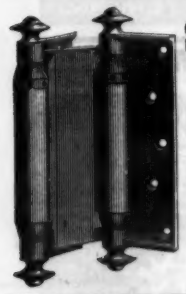

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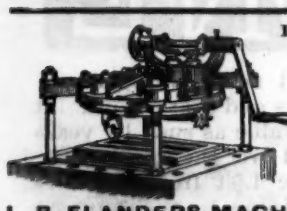

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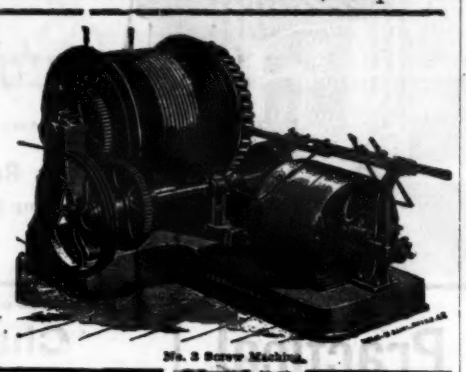

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